OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND REGION

THESIS FOR MASTER OF SURGERY (OPHTHALMOLOGY)







BUNDELKHAND UNIVERSITY, JHANSI

DEPARTMENT OF OPHTHALMOLOGY
M.L.B. MEDICAL COLLEGE,
JHANSI

CERTIFICATE

This is to certify that the work
entitled " OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND
REGION " which is being submitted by DR. MAHESH CHANDRA
AGARWAL as a thesis for M.S.(Ophthalmology) examination,
was carried out in the DEPARTMENT OF OPHTHALMOLOGY,
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was carried out under our personal supervision and

guidance. Examination of patients was done by candidate

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"Lepresy is most thrilling and exciting adventure on which any medical man can embark ". (Cochrane, 1956).

Lepresy is a disease of antiquity, occurs throughout the world. It manifests itself in the form of a clinical, histological, bacteriological and immunological spectrum (Ridley and Jopling, 1966). The different manifestations of the disease may occur as a result of variations in the host (Turk, 1976) and not because of the variations in the virulence of different strains of Mycobacterium leprae, the causative organism (Recs. 1969).

As many as 4 million i.e. almost one third of estimated leprosy patients in the world, live in India.

Of these about 75% patients are in the states of Andhra Pradesh, Tamilnadu, Karnataka, Maharashtra, West Bengal and Orissa. Our state Uttar Pradesh has an estimated number of 5 lac patients mainly distributed in Eastern and Bundelkhand regions. In the later the estimated prevalence rate is 5.35 per 1000 population (Nigam et al. 1975). Thus Bundelkhand is an endemic area for leprosy.

Leprosy is not merely an infective disease but is a disastrous ghost. It affects many parts of the body mostly skin, nervous system, reticulo-endothelial system, eye, nose etc. It progresses slowly destroying the nerves, resulting in deformities, mutilation and debility including blindness, leading to complete holocaust.

Observing this pitiable condition of a large majority of leprosy patients and blind persons and realizing their effect on society, our Monourable Prime Minister Mrs. Indra Gandhi, has included leprosy and blindness control in her ' Revised Twenty Points Programme 'in preference to other diseases prevalent in India.

has been known since long, yet authentic references of eye involvement are not available in ancient literature. However, Bull and Hansen (1873) are the pioneers to note the eye lesions in detail caused by leprosy. They described eye involvement in leprosy as very common. They noted that leprosy mainly affects outer parts of eye like cornea and iris and rerely interior of eye i.e. fundus. Punctate keratitis and chronic exudative iritis were very common in their experience. Great frequency of lid and eyebrow involvement was noticed by Lepez (1891), Endogenous infection of uven was suggested by Jeanselme and Morax (1898). Later on various workers described histopathological, bischemical and clinical changes in eye, caused by leprosy.

The ocular legions in legrosy may result indirectly from paralysis of the V or VII cranial nerve, or directly because of invasion by the M. legrae (Carrica et al. 1979).

The former is more often seen in tuberculoid form of the disease and the later in lepromatous form. A mixed picture is seen in borderline type of leprosy.

The incidence of involvement of the eye in leprosy has been reported in wide ranges by various authors (Ibid). This frequency varies according to the type and duration of disease. Indian studies also show variations from 11.3 percent ocular lesion in leprosy (Acharya 1978) upto 84 percent (Reddy et al., 1981); (Saxena and Dwivedi, 1971). These studies do not reflect a true prevalence of ocular lesions of leprosy in India. Our vest country has wide regional and racial differences.

An analysis of ocular complications, from available data, shows that the disease almost exclusively affects the anterior segment of the eye. This implies that many of these complications are amenable to therapy and probably preventable. This has been well shown by the work done at Carville and many other centres, particularly in reference to lid problems because of trigeminal or facial nerve paralysis. There remains, however, the major problem

of chronic iritis which seems to develop early & silently in many lepromatous patients and continues relentlessly inspite of conventional therapy. Whatsoever may be the type of eye involvement in leprosy, if it is allowed to progress, it may result in loss of vision. Blindness in an individual who has normal skin sensitivity is enough of a handicap, but in the one, who has lost that faculty, it is disastrous. Few have the resources, material, mental or spiritual to live with it.

of the prevalence of various ocular lesions among leprosy patients in Jhansi and surrounding districts, their relationship with the duration and the type of disease and to find out preventable value of regular and controlled treatment of leprosy on the eye involvement.

REVIEW OF LITERATURE

I. INTRODUCTION

The word leper is derived from a Greek word meaning scaly or like parchment. Leprosy is a chronic infectious disease primarily affecting the peripheral nervous system and secondarily involving skin, mucosa of mouth and upper respiratory tract, reticuloendothelial system, eyes, bones and testes.

Leprosy has a wide distribution throughout the world and is most prevalent in tropics and subtropics. A recent W.H.O. report suggests that number of leprosy patients are more than 12 millions. About one third of these are residing in India, mostly in Andhra Pradesh, Tamilnadu, Bihar, Maharashtra, West Bengal, Orissa, Uttar Pradesh and Madhya Pradesh. Study area Bundelkhand Region is a part of Uttar Pradesh and Madhya Pradesh. Estimated prevalence of leprosy is 5.35 per 1000 population in Bundelkhand region (Nigam et al, 1975).

The causes of leprosy is an acid fast bacilli, Mycobacterium leprae, which in appearance closely resembles to tubercle bacillus. Susceptibility to leprous infection varies markedly and, therefore,

the entry of M. leprae into the body of an infected person produces different results. Development or non development of the disease and the type thereof, are determined by degree of specific immunity that the infected individual can develop. This degree of immunity is reflected not only in clinical variations of disease but also varying histopathological and bacteriological findings in different forms of disease. Leprosy bacilli have a predilection for neural tissue and whatsoever may be the route of entry into nerves, the tanget organ is the Schwann cell, the scavenger cell of nerves and the counter part of the histiocyte in the skin. Once bacilli have been engulfed by Schwann cells their subsequent fate and type of laprosy which ensues, depend on the resistance of the infected individual, (Jopling, 1971).

II. TYPES OF LEPROSY

In lepromatous type, which occurs in persons with poor immunity; the bacilli multiply enormously and spread widely in the body, resulting in a progressive and systemic disease with large number of bacilli. In this type, in addition to the skin, nerves and lymph glands involved, there is involvement of eyes, nose, mouth, laryax and various internal organs.

Therefore alongwith skin and nerve lesions various symptoms are produced by involvement of eyes, nose and larynx. In male patients involvement of testicles produces orchitis, testicular atrophy, sterility and gynaecomastia. (Dharmendra, 1978).

In tuberculoid type (Occurring in persons with good immunity), the bacilli can multiply only to a limited extent, this results in the production of a localised, self limiting disease with scanty bacilli. In this type skin and nerve are mainly affected, and tuberculoid granuloma may be found in the regional lymph nodes. The disease is characterised by skin lesions and thickening of affected nerves; the nerve damage may lead to serious deformities and persistant ulcers.

The borderline type, shares the tuberculoid and lepromatous features to varying extents, and therefore symptoms are very pleomorphic.

Leprosy is a chronic disease which progresses and regresses slowly. However, during the long course of disease, there may occur acute bouts of exacerbations generally known as " Reaction ".

There is little doubt that the lepromatous form of leprosy is responsible for the major ocular problems. Indeed it has been said that given enough time,

all patients with lepromatous leprosy will develop ocular complications (Harley, 1946). Tuberculoid and borderline leprosy also cause ocular damage through their effect on the facial and trigeminal nerves. All forms of disease may develop acute iritis with complications, but it is the lepromatous patient that is likely to have long term visual problems which can culminate in blindness.

Lepromatous leprosy is commoner in temperate climates and seems to occur more in Asian, South American and European races rather than Africa. In the Indian subcontinent almost equal balance between lepromatous and non-lepromatous leprosy exists (Miller, 1981). In consequence the main ocular problems due to leprosy are to be expected in the Far East, South America, and the more northerly parts of India and Nepal. From information gained from various ophthalmic surveys in different parts of the world and relating it to global distribution of registered leprosy patients, blind leprosy sufferers in the world are estimated to be 5 lacs - 7.5 lacs (Miller, 1981).

III. HISTORY OF LEPROSY

Leprosy is well known to the various parts of the world since ancient time. Authentic

references to this disease is found in Indian and Chinese literature. Sushruta, the ancient physician (600 B.C.) has given good account of clinical features and treatment of disease 'Kushtha'. References to leprosy are made in two places as 'Vat Rakta' or 'Vat Shonita', under the disease of nervous system and 'Kushtha' under the disease of skin. Two kinds of Kushtha' under the disease of skin. Two kinds of Kushtha' have been envisaged, viz 'Kshudra (Minor)-Kushtha'and'Maha-Kushtha'. 'Maha-Kushtha' appears to include conditions corresponding closely with different forms of leprosy. He mentioned Tuvarka (Chaulmoogra or Hydnocarpus) eil and seeds as a petent remedy against leprosy (Dharmendra 1940 & 1947). Charaka, Vegèhata and Manu have also given good account of leprosy in their books.

A reference to leprosy is found in NeiChing (Canon of Internal Medicine), the oldest Chinese Medical treatise, attibuted by Wong to 220 B.C. Ancient Egyptian, Biblical and Buddhist literature mentioned the disease simulating with leprosy.

IV. HISTORY OF OCULAR INVOLVEMENT

Association of leprosy to the blindness has been known since long, yet authentic references of eye involvement are not available in ancient literature.

However Bull and Hansen (1873) are the pieneer to describe in detail the eye lesions caused by leprosy. They found eye involvement in leprosy as very common and noted affection of leprosy commonly towards cornea and iris and rarely to the interior of eye, ie. fundus. Great frequency of lid and eyebrows involvement was noticed by Lopez (1891). Endogenous infection of uvea was suggested by Jeanselme and Morex (1898). These studies, however, were done prior to introduction of slit lamp and only gress legions were described. Later, clinico pathological observations with the aid of slit lamp and microscope by Fuchs (1937), Shiomma (1938) de Barros (1940), Valle (1946), Elliet (1951), Kirwan (1955), Choyce (1959 & 1964), Allen and Byers (1960), Allen (1966), Fiytche (1981) and many other workers had added much into the knowledge of pathogenesis and clinical manifestations.

Lepromatous changes in iris, as seen in electrone microscope have been published by Hashimume and Shaonuma (1965). They noted the presence of Mycobacterium leprae in the smooth muscle cells of iris. Schwartz(1965) measured the temperature gradients in rabbit eye and found a difference of 6°C between the temperature of the corneal surface and the orbit, with a steady gradient

throughout the ocular tissues. Sabin (1969) observed that leprosy bacilli preferentially attack the coolest parts of the body - the skin of extremities, nose, ears, testis and outer part of eye. Prabhakaran (1971) observed that Mycobacterium leprae rapidly exidises DOPA and produces quinones. These quinones interact with the proteins of lens, leading to cataractous condition.

Swift (1972) studied pupillary reaction in lepromatous leprosy patients.

Hobbs et al (1978) demonstrated anterior segment involvement by M. leprae in experimental animals. Development of an experimental animal model ought to prove a turning point in the understanding of ocular pathology in leprosy (Ffytche, 1981).

V.MECHANISM OF OCULAR INVOLVEMENT IN LEPROSY

The ocular lesions in leprosy may result indirectly from paralysis of the V or VII cranial nerves or directly by invasion by the M. leprae (Corrica et al, 1979). The former is more often seen in tuberculoid form of the disease and later in lepromatous form. A mixed picture is seen in borderline type of leprosy. However, ecular damage in leprosy occurs in 4 ways: (A) Facial and Trigeminal nerve involvement (B) Hypersensitivity reactions (C) Direct bacterial invasion (D) Secondary infection (Frytche 1981).

(A) Facial and trigeminal nerve involvement

Leprosy is essentially a neural disease with infection and eventual destruction of superficial nerves by M. Leprae. The anatomical position of the facial nerve, especially the zygomatic branch, and the superficial branches of the trigeminal nerve make these structures vulnerable to infection in all forms of leprosy. A combination of these 2 nerve palsies may abolish the normal blink and corneal reflexes and lead to exposure heratitis. With its subsequent corneal damage and epacification. The incidence of these major corneal problems is however, less than might be expected since preservation of normal Bell's phenomenon prolongs the protection of the cornea (Emiru 1970). Even so, facial palsy has been considered to be the second commonest cause of blindness in leprosy (Krassai 1970).

(B) Hypersensitivity reactions

In all forms of leprosy but particularly when a change in polarity occurs, a hypersensitivity reaction can take place. The clinical manifestations are believed to be caused by circulating immune complexes becoming deposited in the affected tissues (Grove et al 1976, Hobbs et al 1978) rather than a response to bacteria. The eye develops an acute iritis which is usually bilateral. M. leprae have been demonstrated in the anterior chamber by paracentesis (Michelson et al 1979) but it is not known that role they play in the pathogenesis of acute uveitis.

(C) Direct Bacterial Invasion

Direct bacterial invasion occurs only in lepromatous leprosy. It is now considered by most authors to take place as a result of a bacteraemia following infection (Harley 1946; Drutz 1972), although some spread may occurs from infected lacrimal and nasal passages (Holmes 1957) though this method of spread may be rare (Choyce 1972).

(D) Secondary Infection

nutritional control, and exposure and diminished tear production all combine to make cornea susceptible to secondary bacterial, viral and fungal infections. The additional destruction of the nose and masolecrimal passages in advanced cases increases the local reservoir of pathogenic organisms.

VI. OCULAR PATHOLOGY

Loss of eyebrows and eyelashes is due to infiltration of hair follicles. They degenerate and tend to turn white and splinter and then to fall out (Duke-Elder 1966) leading to alopecia and madarosis.

Skin of supraciliary region become thickened in lepromatous and borderline leprosy due to infiltration of skin. Pathology of lid lesions is the same as the skin of other parts. Usually a diffuse infiltration begins in the intramarginal area, extending through the tarsal plate becoming visible to conjunctival surface. This lid infiltrate causes destruction of elastic and connective tissue leading to the flaccid entropion and consequent trichiasis (Harrel 1977).

Involvement of lacrimal sac in leprosy occurs both by direct infection of the sac or infection extending from masal mucesa. Atresia may develop owing to destruction and deformities in the surrounding structures (King, 1936). Involvement of lacrimal gland is due to almost universal distribution of bacilli (Amendola 1944).

Involvement of orbicularis oculi in leprosy is due to paralysis of the superficial branches of facial nerve. However Slem (1971) found leprous myositis on histopathological examination of orbicularis oculi muscle and stated that leprous myositis is also a contributory factor for lagophthalmos. Conjunctival mucosa is remarkably immune to leprous infection, however leprosy bacilli may be found in the conjunctival sac of leprosy patients. Chronic catarrhal conjunctivitis with papillary hypertrophy may develop in leprosy patients (Harley 1946). Indeed it has

been said that true leprous conjunctivitis does not exists (Aparisi 1950, Somerset 1962).

Frequent early involvement of cornea is due to the fact that capillary and lymphatic networks are more at limbus corneae similar to those of skin. flow is slow and veneus pressure is low making ideal conditions for fixation of leprosy bacilli (Hibi 1956). The transitory opacity of corneal nerves is due to oedema of nerves accompanying the localization, multiplication of bacilli in or adjacent to the nerves. Plasma cells and lymphocytes aggregate around the nerves giving the appearance of beading. After a few weeks the cells migrate out and the epacity disappears (Allen 1960). Superficial punctate keratitis in leprosy is an infiltration by mononuclear cells i.e. plasma cells, lymphocytes and epithelioid cells just beneath the Bowman's membrane or between Bowman's membrane and epithelium. These cells remain in clustures and clusture increases in number and size by accumulation of more cells. The individuallepra cells may continue to increase in size by multiplication of organism and also by engulfing the adjacent lepra cells (Allen 1960). Superficial punctate keratitis may progress to form a circumferential pennus or an interstitial keratitis (Ffytche 1981).

In interstitial keratitis, the inflammatory infiltrates extend into the connective tissue cells in various layers of stroma. In leprotic pannus newly developed capillary extend from the limbic loops into the superficial layers of the cornea between the Bowman's membrane and epithelium.

Other forms of corneal disease and opacification occur as a result of exposure and neuro-paralytic keratopathy and include band shaped keratopathy and various degenerative conditions.

Iris

Pathologically leprous lesions of uveal tract corresponds to these seen elsewhere in the body- a granulomatous infiltration of lymphocytes, large number of mononuclear phagocytes, fibroblasts and occasional polymorphonuclear cells are seen which may lead to extensive areas of necrosis. The mononuclear phagocytes are often packed with bacilli, when cytoplasm becomes swellen and frothy to become foam or lepra cells.

Characterstic and pathognomonic feature of leprosy in iris is the formation of miliary leproma, the pearls. Alongwith early localization of the organism in the iris, a number of mononuclear cells appear in the

in the stroma. These increase in size by multiplication of organism and engulfing the adjacent lepra cells forming colony of acid fast bacilli. The globi enlarge slowly, gradually pushing the nucleus towards and compressing it against the cell well. Some of these become visible clinically as pin point dets at this stage. Usually two or more similar cells come into contact coalesce and form a giant foam cell. Which continue to grow slowly throughout the life of patient (Allen 1966). The pearl, in addition to living organism contains considerable lipid material, cellular debris and some calcium salts.

VII. PREVALANCE OF OCULAR INVOLVEMENT

Prevalence of ocular complications and blindness is difficult to determine (Miller 1981).

Frequency of ocular involvement in lepresy varied gree in different reports from different parts of the we.

It depends upon the race, climate, type of lepresy, reaction of leprosy, duration of disease and duration of treatment along with regularity and type of treatment.

Patient's general health, nutritional status and presence of other diseases also affects the ocular involvement.

Interpretation of what constitutes ocular involvement may wary with different investigators.

Some investigators included non leprotic eye lesions in their results while other had excluded them. Some studies were performed in the remote areas, where slit lamp examination facility was not available. Moreover some investigators reviewed hospital charts, in which significant observation may have been omitted. Study performed in pre-sulphone era or post-sulphone era also had effect on the frequency of ocular involvement (Sheild 1974). It has been stated that given enough time almost all patients of lepromatous leprosy will develop ocular involvement (Harley 1946).

reported as high as 91% in U.S.A.by Prendergast (1940);
90% in Panama by Harley (1946); 94% in Egypt by Wasfy
(1971); 70% in Vietnam by Hornblass (1973); 72% in Brazil
by Sheild (1974). On the other hand a low figure of only
10% has been reported in Central Tanganyika by McLaren
(1963) and also in South Korea by Holmes (1957).

Even in India, prevalence of ocular lesions reported has varied viz 84% by Reddy and Subrahamanyam (1981); 25% by Sehgal and Agarwal (1976) and 11.7% by Acharya (1978).

VIII. DISTRIBUTION OF OCULAR LESIONS

(A). Ocular Adenexa

of eyebrows varied from 13% to 100% (Chaterjee and Chaudhary 1964; Richard 1969; Wasfy 1971. Prevalence of loss of eyebrows is much common in lepromatous than borderline and tuberculeid leprosy. In most of countries where disease is endemic, loss of eyebrows is so frequent that it is one of the best known stigmata recognised by physicians and laymen alike. Why loss of eyebrows start from the lateral side, is not clear.

Loss of eyelashes is also common in lepromatous type of leprosy. Frequency of loss of eyelashes has been reported 44% by Sheild (1974); 15% by Wasfy (1971) and only 1% by Chatterjee and Chaudhary (1964). Loss of eyebrows and eyelashes is characteratic but not pathognomenic of leprosy (Sheild 1974). Other causes of loss of eyebrows and eyelashes are thyroid disease, Hypopituitarism, Chronic blepharitis, Chronic epinephrine therapy, Vogt Koyanagi Harada syndrome and certain intoxications.

Entropion is a complication of leprosy about which little has been written in the past. McLaren et al (1961) seems to be first to record the occurrence

ef entrepion in leprosy. Richard and Arrington (1969) also mentioned entrepion as a sign of leprosy. In leprotic entropion, there is no scarring of conjunctiva as seen in trachoma (Emiru 1970). Due to infiltration of lid skin and tarsal plate direction of eye lashes become irregular in leprosy patients. Frequency of trichiasis has been reported by various workers as, 1% (Sheild, 1974); 3% (Chatterjee and Chaudhary, 1964) and 8.2% (Emiru, 1970).

Skin of supraciliary region become thickened due to the leprous infiltration. Frequency of this lesion varied from 7% to 29% (Harrel 1977; Sheild 1974).

reported as high as 36% in tuberculoid leprosy and 32% in lepromatous leprosy by Malla et al (1981) 30% in tuberculoid and 6% in lepromatous by Choyce (1972). Other workers have reported lower prevalence of lagophthalmos in leprosy patients (McLaren 1961; Dethlefs 1981).

Sheild et al (1974) has reported 2 cases of frontalis palsy along with orbicularis oculi paralysis.
Out of 15 patients with legophthalmos, only 5 patients had exposure keratitis. In rest of the patients cornea was normal due to Bell's phenomenon (Sheild 1974).

Lacrimal system involvement has been reported by only few workers. Weerekoon (1969) in Ceylon found 14 cases of lacrimal obstruction among 297 cases of leprosy with ocular involvement. Emiru (1970) found only one case of lacrimal obstruction among 890 patients.

Atkinson (1934) reported a case of nodular leprosy wherein rapid hypertrophy of gland lead to its dislocation.

Cochrane (1940) reported involvement of lacrimal gland in a case of tuberculoid leprosy and assumed it as allergic response of lacrimal gland same to the skin and mucous membrane.

(B) Conjunctiva. Episelera and Selera

Involvement of conjunctiva is not common in leprosy patients. Malla et al (1981) have reported 9.8% conjunctivitis among lepromatous leprosy patients and 3.8% conjunctivitis in the tuberculoid leprosy patients. Weerekoon (1969) reported 10.5% prevalence of conjunctivitis among leprosy patients (type not specified). The conjunctivitis in leprosy patients is not specific.

Prevalence of scleritis and episcleritis have been reported 17% in Ceylon by Weerekoon (1969); 5% in Brazil by Sheild (1974); 1% in Ghana by Chatterjee and Chaudhery (1964).

Epischeral nodules, however, are the characteristics, found to be very infrequent 0.5% (Emiru 1970). These begins as an oral slightly elongated, yellowish pink mass alongside the lower limbus. The adjacent cornea is eventually affected with a selerosing keratitis (Weerekoon 1969).

(C) Cernea

Prevalence of corneal involvement varied greatly from worker to worker, ranging from 90% in Hawaii (Pinkerton, 1927) to 1.6% in Uganda (Emiru 1970). Hornblass (1973) observed 80% corneal involvement. It also varied in different races. Low prevalence of ocular lesion was seen in Bantus and significantly higher among Europeons in Africa, a finding parallel in India when native Indians are compared with Europeons.

nerves was observed in both tuberculoid as well as lepromatous leprosy along with beading or sheath like formation on corneal nerves. (Minder 1929). The nerves in the upper temperal quadrants are the first to be involved but, several nerves in each or any quadrant may become spague either as on initial or as an recurrent phenomenon (Allen 1960).

Punctate keratitis forms a pathognomonic picture unlike any thing else (Hansen 1873). It is also commonest manifestation of the disease in eye (Hibi 1956). It appears as minute white spots irregular in outline, looking like grains of chalk are scattered (Duke-Elder 1966). This condition do not give rise to pain or any subjective symptom and may remain unnoticed until its progress toward centre of cornea causing blurring of vision.

the thin greyish white diffuse opacity may disappear or may persist, but the chalky white punctate opacities remain permenently (Allen 1960). On the other hand it may persist or progress deeply to form an interstitial keratitis or vessels from limbus may grow to form pannus. Chalky white specities may also increase in size and become spherical or globular. They become visible grossly and are termed miliary leprometa (Allen 1960).

Interstitial keratitis usually occurs as sequelae to involvement of ciliary body or as an extension of limbal nodule. This condition is frequently bilateral and commonest site is the upper and outer quadrant. It may be accompanied by circum corneal congestion but interstitial vascularization is scanty and late.

(D) Iris

Prevalence of iris involvement in leprosy patients is found to vary greatly from 91% (Prendergast, 1940) to only 3% (Chatterjee and Chaudhery, 1964).

Choyce (1972) in Malawi found iridocyclitis in 24% cases.

Iris is mostly involved in lepromatous type of leprosy 40.6% than tuberculoid type of leprosy 7.2% (Malla et al, 1981).

associated with lepra reaction, is rarely insidious in onset. In majority of cases of is characterized by a sudden, violent enset with development of intense inflammatory symptoms. Clinically it differes in no way from a non specific acute inflammation of iris (Mendonca de Barros 1940). If untreated, the eye can be permanently damaged within 24-72 hours (Cheyce 1972). Aqueous flare and cells, keratic precipitates, hypopyon and synechiae with secondary cataract and eventual phthasis (Ffytche 1981).

In sub acute or chronic diffuse iritis acute inflammatory symptoms are absent or almost so.

(Weerekoon 1969). Occasionally they are diagnosed only by slit lamp examinations at other times the patient comes to the clinic complaining only of slight duliness

of vision. In these cases very discrete ciliary congestion develops which is sometimes almost imperceptible. Corneal cedema is always present but of less intensity. The Tyndall phenomenon of aqueous is not very marked. Floating corpuscles are visible sometimes in limited number, K.Ps. are not a usual feature in these cases (Weerekoon 1970). The pupil is little dilated showing less reaction to light than the opposite eye. (Mendenca de Barros 1940).

and small adhesions between the edge of pupil and anterior surface of lens can be seen. Gradually a small amount of plastic emudate covers the centre of anterior surface of the lens in the area of small pupil leading to serious loss of vision. Unfortunately chronic diffuse iritis was found to be the most common blinding lesion in leprosy patients (Hobbs & Choyce 1971).

Specific type of iris atrophy has been reported by Slem ,(1971). It is characterized by patchy degeneration and disappearance of iris stroma, followed by loss of epithelium and hole in the iris. Sheild (1974) also reported 2 cases of specific iris atrophy and 5 non specific perhypupillary atrophy among 100 leprosy patients. Ffytche (1981) reported gross atrophy of

dilator muscle of iris as common as 7.3%. He suggested dilator is thin and spread throughout the iris and its consequent atrophy gives rise to the increased friability of the tissue and persistence of troublesome miosis.

Miliary or nodular iritis is the main pathognomonic lesion of leprotic involvement of iris. In this pearl like granulations observed near the sphincter in the deep mesodermic layers (Mendonca de Barros 1940). They are extremely small about 0.5-1.0 mm in diameter dull yellow in colour and round in shape. Very often there is no sign of inflammation. These lesions remain unchanged for years or may disappear after some months leaving non trace or alternatively small areas of atrophy (Valettas 1916). Which indicate that eyes tolerate them well. These miliary nodules do not interfere with vision and pupil reacts to light more or less normally. Sometimes they attain a large size and fall off into the angle of anterior chamber. Where they are absorbed (Allen 1966). They are considered to be exudative in nature (Kirwan 1927).

Swift (1972) studied the pupillary reaction in patients of lepromatous leprosy and observed missis of pupil alongwith sluggish reaction to light.

(E) Cataract

Direct invasion of the lens by bacilli
has never been demonstrated and many authors consider
that there is no true leprosy cataract and that the
lens changes are those seen in a normal aging population
(Prendergast 1940; Weerekeen 1969). A secondary cataract
may certainly develop after the acute iritis associated
with hypersensitivity but some authors acknowledge a
higher incidence of secondary cataract following chronic
iritis (Harley 1946; Choyee 1969). Possible cause for
cataract in lepromatous leprosy was suggested by
Prabhakaran (1971) who noted that the leprosy bacilli
reacts with DOPA which is normally found in iris and
ciliary body. This reaction produces high local concentrations of quinones, which are known to be cataractogenic.

Catarast was found to be the common cause of blindness 23.9% in leprosy patients (Malla et al 1981).

(F) Fundus

A difference of opinion exists as to leprotic menifestations in the posterior segment of the eye. Examination of the fundus in leprosy patient with well advanced disease is difficult partly because of constricted pupil with posterior synechia or occlusio pupillae and partly because of haziness caused by corneal lenticular or vitreous opacities, Malla et al (1981) have reported non specific changes in the fundus of leprosy patients.

Some observers consider that the choroid is immume apart from the spread of disease directly from ciliary body, particularly in lower temporal quadrant. Franke and Delbance (1900) Choyce (1959). The choroidal lesions may be unilateral or bilateral and appear as white, isolated, atrophic or sear like areas with some pigmentary preliferation. They may bef few or numberous varying in size from pin head to a disc diameter. The smaller punctate lesions resemble the miliary lepromata seen on the iris (Trantas 1899; Elliot 1949; Somerset 1962). Some workers have reported a picture of typical disseminated choroiditis (Pinchet 1929; Hoffmann 1929; Slem 1971) and named it as choroiditis leprosa precess. They thought it to be a sign of latent leprosy.

end when it does occur it is usually secondary to an infection of uveal tract (Trantas 1899). Very rarely wide spread inflammatory changes may be seen on ratina. Pearl like nodules were detected (Elliot 1949) These lepra pearls may be seen as small waxy or creamy white pedunculted nodules lying superficially on the ratina and

projecting into the vitreous. Usually they are in the peripheral fundus, so near the ora that their ophthal-moscopic observation is difficult (Somerset 1956).

(G) Intraocular tension

Only few workers have reported change in Intraocular tension (IOT) in leprosy patients. Slem(1971) performed tonometric examination of 38 eyes and found abnormally low pressure. Tonographic studies of 49 eyes showed that equeous production and drainage were diminished in leprosy patients. Brandt et al (1981). Observed that chronic plastic iridecyclitis reduces IOT in lepromatous as well as in tuberculoid leprosy patients. Sheild et al (1974) found glaucoma in 12% cases, however these cases were diagnosed on the basis of glaucomatous supping not on the basis of elevated I.O.T.

(H) Visual Acuity

by most of the workers in their studies, yet details of visual scuity has not been given by any of the worker. Similar to the prevalence of other ocular lesions prevalence of blindness varied considerably. Malla et al (1981) recorded 13.9% cases of tuberculoid leprosy and 26.1% cases of lepromatous leprosy with their vision \(\frac{6}{60}\). While Harrel (1977) has recorded 50% cases visual

acuity /6/60 in Canalzone. Visual acuity /3/60 has been recorded in 1.3% cases in uganda (Emiru 1970), 13.6% cases in Ceylon (Weerekoon 1969). 5.8% cases. Northern Ghana (Chatterjee and Chaudhary 1964).

However Reddy and Subrahmaniyam (1981) in a study in Rakinanda (India) found 5 cases of lepromatous leprosy and 3 cases of tuberculoid leprosy having vision /6/60 among 100 cases of leprosy.

Apart from non leprotic lesions like trachoma, vit. A deficiency and other eye diseases five main causes of blindness has been mentioned in leprosy patients. These causes many operate singlyor together (Choyce 1959). In order of importance they are, chronic iridecyclitis, lagophthalmos associated with corneal anaesthesia, leprous keratitis, acute iridecyclitis, and presence of intercurrent eye disease like senile estaract and chronic simple glaucoma.

MATERIAL AND METHOD

MATERIAL AND METHOD

MATERIAL

Patients attending leprosy clinic at M.L.B. Medical College, Hospital, Jhansi were the subject of this study. Almost all the patients attending the clinic on a particular day were included in the study.

These patients were of all age groups and belonged to Jhansi district and nearby districts of Utter Pradesh and Madhya Pradesh forming the Bundelkhand region. A total of 180 patients attending the clinic between June 82 to April 83 were included in the study. Diagnosis of leprosy was confirmed by the dermatovenereologist on clinical features supported by histopathology and slit & smear examination.

The area of study, Bundelkhand region spread over two states of Utter Pradesh and Madhya Pradesh (Fig. 1), is located between 23° 10° and 26° 30° North Latitude and 78° 21° and 81° 40° East longitude. The region covers a total geographical area of 70,000 Sq.Km. including eleven districts five of which viz. Jhansi, Lalitpur, Jalaum, Hamirpur and Banda are in Utter Pradesh and remaining six district viz. Datia, Tikamgarh, Chhatarpur, Panna, Dameh and Sagar in Madhya Pradesh (Fig. 2).

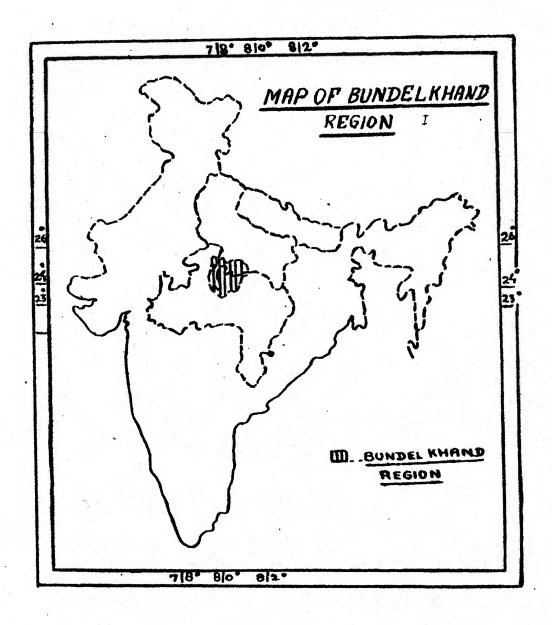


Fig. 1

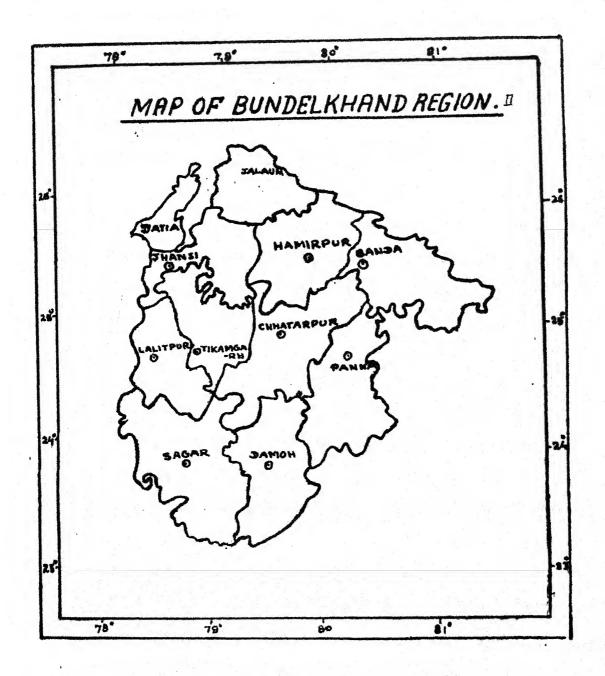


Fig. 2

The region represents a transitional zone of tropical dry subhumid in the east to tropical semiarid in the west. The overall mean annual temperature of the region is high and varies from 25-26°C.

METHOD

Details of the findings of each patient were recorded on a proforma (Annexure -I). General information of patient along with duration of disease, duration of treatment, regularity of treatment, type of treatment and its reaction were recorded. Ocular history was recorded in detail.

hypopigmented patches, nerve thickening hyposesthesis or ansesthesis of any part of body and deformities of face, hands and feet were noticed. Leprosy was classified according to Ridley and Jopling (1966) system, but broadly grouped into 5 types i.e. Tuberculoid included TT and BT, Borderline included BB, Lepromatous included BL and LL. Types of reaction - type I and type II were also noticed.

Examination of Eve: - Following procedure was adopted for the examination of eye: Record of visual acuity,

diffuse light examination, focal illumination, tonometry and funduscopy.

I. Visual Acuity

Visual acuity was recorded with Smellen chart placed at 6 meter distance. Hand movements, perception of light and projection of rays were recorded in patients with much diminished visual acuity.

II. Examination under diffuse light

Eyes were examined externally under the diffuse light of a well focussed ordinary torch. Face was examined for any gross deformity and for the function of frontalis and orbicularis oculimuscles.

Lacrimal system was examined for any sign of acute or chronic dacryocystitis, dacryoadenitis. Pressure regurgitation test was done in every case and was followed by syringing, if thought necessary.

Eyebrows were examined for complete or partial loss, nodules, and thickening of the skin of supraciliary region.

Lid and eyelashes were examined for partial or complete loss, regular or irregular pattern. Lid margins were examined for drooping of lid and invelling or outrolling of lid margin.

Conjunctiva was examined for acute or chronic conjuctivitis and nodule. Non specific changes such as pterygium, pinguecula, and xerosis were also noted.

Selera was examined for lepromatous nodules, non specific scleritis, episcleritis, and ciliary staphyloma.

Cornea was examined for superficial, interstitial and exposure keratitis. Vascularisation of cornea, opacity and ulcer were also noted. If ulcer was suspected it was confirmed by staining of cornea with 2% fluorescein. Corneal sensation was also tested with cotton wisp.

Anterior chamber was examined for its depth and contents, especially to find out keratic precipitates, flage or iris pearl.

Iris was examined for celour, surface, pattern and any nodular growth on it. Synechiae and atrophy were also seen.

Pupil was examined for size, shape, and reaction to light. Pupillary reaction was considered to be normal if pupil constricted briskly with 4-5

oscillations and fixed in the constricted position.

Lens were examined for any opacity or pigmentation over its anterior capsule.

III. Examination under local illumination

Slit lamp examination of each case was done on G. Rodenstock instrument (Munchen Hamburg - Germany) in a semidarkened room, in ophthalmic department. Patient was made to sit on stool and fix his head in a proper position. All the structures of anterior eye were examined by various methods of illumination, i.e. diffuse illumination, sclerotic scatter, direct focal illumination, direct and indirect retro illumination, zones of specular reflection and indirect illumination.

Details of the lesions of lid, conjunctive, cornea, enterior chamber, iris and less were noted. Special attention was given to find out early punctate keratitis and iris pearl.

IV. Tememetry

Tension was recorded with Schiotz's tenometer in all the patients under surface enasythesis (4% xylocain) unless, contraindicated.

V. <u>Funduscopy</u>

Examination of fundus was done with direct ophthalmoscope (Keeler's practitioner). Pupils were dilated

widely with Drosyn (10% phenyl ephrine hydrochloride). Details of the specific or non-specific lesions in the fundus were noted.

OBSERVATION

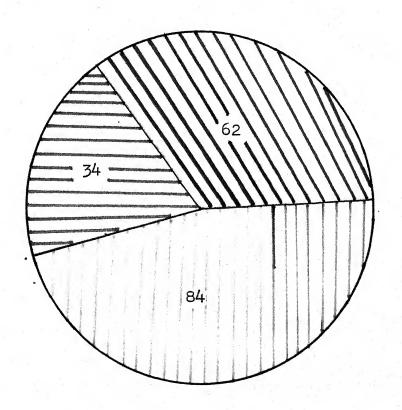
The present study was carried out on 180 leprosy patients, attending the leprosy clinic in the Skin, V.D. and Leprosy department of M.L.B. Medical College, Hospital, Jhansi. Out of total 180 patients, 84 were having lepromatous leprosy, 62 were having tuberculoid leprosy and 34 were having borderline leprosy (Fig. 3) A total of 102 (56.7%) patients were observed to have ocular involvement, 72(40.0%) had leprotic eye lesions and 30 (16.7%) had other eye lesions probably not related to leprosy. (Table 1, Fig. 4).

Table 1 INVOLVEMENT OF EYE IN LEPROSY

	Leprosy	Patients	with eye lesions	Patients
	petients under study	Leprotic lesions	Non lepretic eye lesions	without ey lesions
Total number	180	72	30	78
Percen- tage	100	40	16.7	43.3

It was also observed that prevalence of ocular lesion was highest in lepromatous leprosy(72.6%) and lewest in tuberculoid leprosy (40.5%). Borderline

Fig. 3 DISTRIBUTION OF PATIENTS ACCORDING TO TYPE
OF LEPROSY

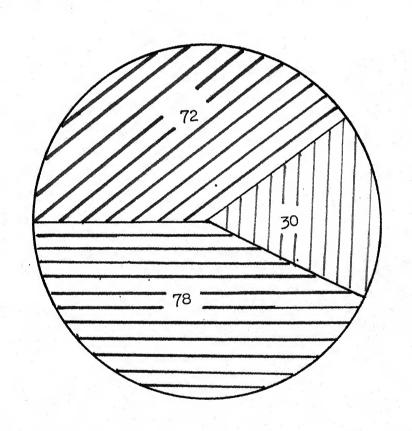


Tuberculoid

Borderline .

| Lepromatous

Fig. 4 PREVALENCE OF OCULAR MANIFESTATIONS
OF LEPROSY



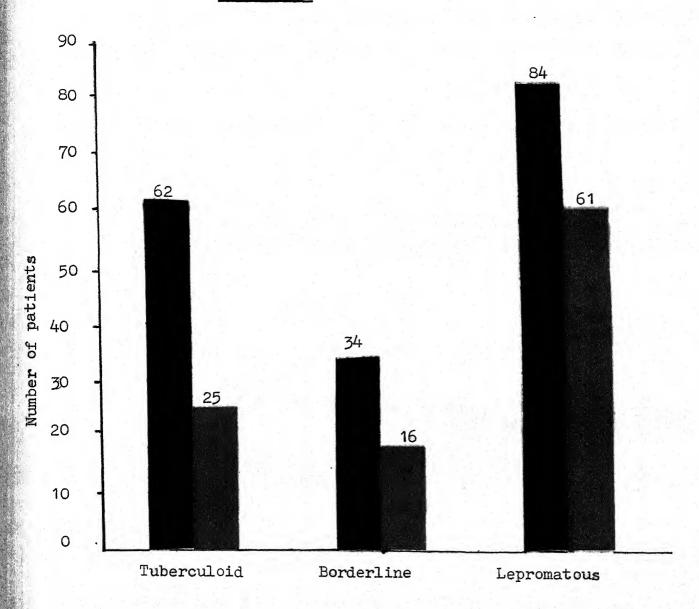
No Eye Lesion

1111

Leprotic Eye Lesions

Non Leprotic Eye Lesions

Fig. 5 OCULAR INVOLVEMENT IN VARIOUS TYPES
OF LEPROSY



Total patients

Patients with ocular involvement

leprosy was found to have prevalence of ocular lesions (47.06%) in between the two polar types of leprosy. (Table 2 Fig.5).

Table 2

PREVALENCE OF OCULAR LESIONS IN DIFFERENT TYPES OF
LEPROSY

	Tuberculeid	Berderline	Leprometous	Total
Number of patients	62	9 4	84	180
Number of patients				
with ocular lesions	25	16	61	102
Percentage of patients				
with ocular lesions	40.3	47.0	72.6	56.7

x² = 16.72 p _ 0.001 (Highly significant) degree of freedom - 2

Relationship of various eye lesions with demographic variable (viz - age, sex, marital status, occupation, socioeconomic status and rural - urban inhabitance), duration of leprosy and duration of treatment alongwith regularity of treatment were studied and presented in details.

Age and Sex

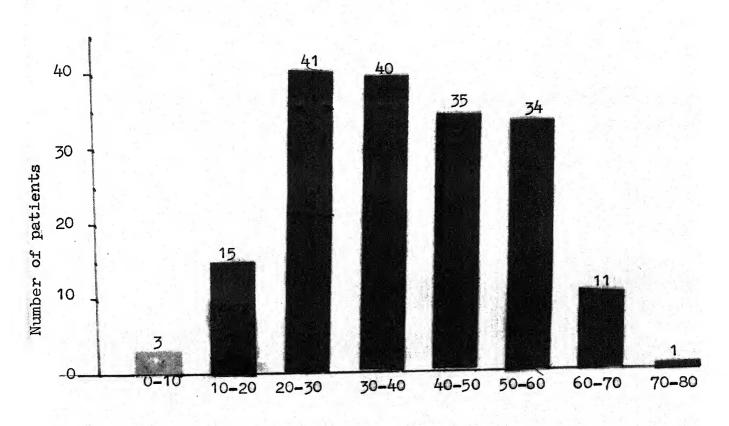
Distribution of the leprosy patients according to their age and sex is shown in table 3
Fig. 6 & 7. Leprosy patients were in the range of 5-78
years of age with mean age 41.56 years. Majority of
patients 150(83.3%) were between 3rd and 6th decade of
their lives. Only 3 (1.6%) patients were below the age
of 10 years and 12 (6.66%) were above the age of 60 years.
Less than a quarter of leprosy patients included in the
study were famales 42(22.2%) with almost same age
distribution.

Table 3

DISTRIBUTION OF LEPROSY PATIENTS BY AGE-SEX AND TYPE
OF LEPROSY

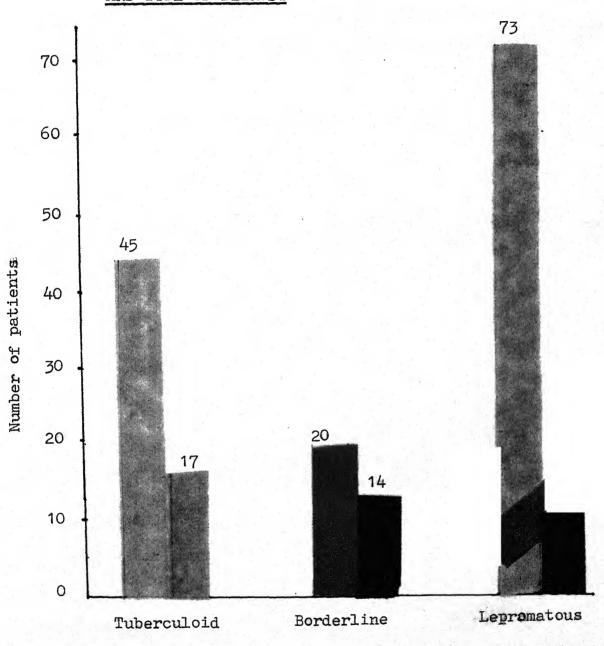
	Tuber	rculeid	Bon	derline	Lepr	one tora	7	otel.
	Mele	Female	Mele	Female	Mele	Female	Male	Female
0 -10	***			2	1		1	2
10-20	4	2	1	4	6	1	11	4
20-30	14	2	7	1	14	3	35	6
30-40	8	7	4	5	15	1	27	13
40-50	10	2	3	3	16	1	29	6
50-60	9	2		c 2	13	•	26	8
60-70		2	1		7	1		3
70-80			•		1	•	1	•
Total	45	17	20	14	73	11	138	42

Fig.6 <u>DISTRIBUTION OF LEPROSY PATIENTS ACCORDING</u>
TO THEIR AGE



Age Group

Fig.7 DISTRIBUTION OF PATIENTS ACCORDING TO THEIR SEX AND TYPE OF LEPROSY



Male Female

able 4

PREVALENCE OF OCULAR LESTONS BY AGE AND TYPE OF LEPROSY

sĒ	Tation in the second		ooular na	No.of patients	Petion	Patients with center	No.of petients	Patient With oc lesions	Patients mts with ocular	No. of Patients patients with cou	arta Retal	Patients with ocular lesions
			83		Ž	93		8	%		No.	(%)
9 8			•	•			a			-	•	•
8	•	m	(80,05)	9	1	•	ou.		•	7	m	(42.8%)
8	\$	to.	3.2	*	N	(12.5%)	•	CV	(25.0%)	4	0	(52.9%)
	3	R	(57.5%)	ħ	9	(%0.0%)	•	4	(44.4%)	16	2	(81.3%)
À	A	*	(74.34)	2	00	(89,6%)	9	10	(83,3%)	4	2	(76.5%)
	*	N	(3.48)		*	(62,6%)	9	*	(89.99)	4	4	(94.1%)
2	*	•	(80,1%)	ou	est	(100.0%)		-	(100.0%)	•	w	(75.0%)
			(100,0%)		•	•				-	~	(100.0%)
	8	\$	(36.7%)	62	10	(40.3%)	*	2	(47.06%)	4	1.9	(72.6%)

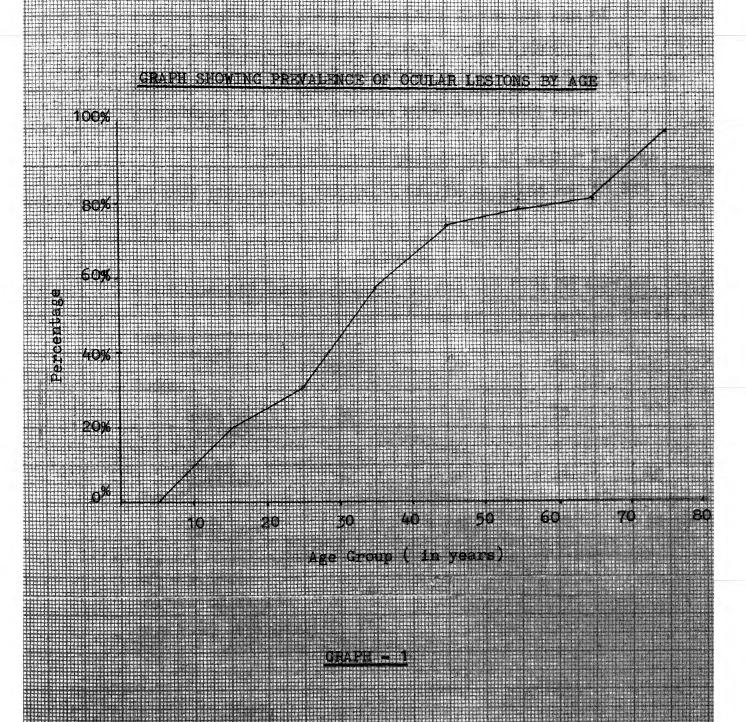


Table 4 shows prevalence of ocular lesions in different age groups of leprosy patients. Analysis of this table reveals higher percentage (75-100%) of ocular lesions in elderly patients above the age of 60 years in all types of leprosy. Graph 1 shows progressively increasing nature of curve, as drawn between prevalence of ocular lesions with increasing age.

Table 5 shows prevalence of ocular lesions in male and female patients: 55.79% in males and 59.52% in females.

Table 5

PREVALENCE OF OCULAR LESIONS BY SEX AND TYPE OF LEPROSY

7	and the state of t	Tuberculeld	Borderline	Lepromatous	Total
Male	No. of patients	45	20	73	138
	No. of Pts. with eye lesions	16	•	53	77
Fema)	No.of patients	17	14	11	42
	No. of Ets. with eye lesions	•			8

x = 0.1820

degree of freedom = 1

p 7 0.50 (Not Significant)

Marital Status

Table 6 shows relationship of ocular involvement with marital status of leprosy patients.

The prevalence was maximum in the widows / widowers/
separated (94.73%) followed by married persons (48.03%).

Unmarried patients had the lowest prevalence (53.33%).

Table 6
PREVALENCE OF OCULAR LESIONS BY MARITAL STATUS

Marital status	No. of patients studied	No. of patients with eye lesions	Prevalence %
Un-married	15	5	33.33
Married	127	61.	48.03
Widows/Widower/ separated	38	36	94.73

x2 - 29.61

degree of freedom - 2

p / 0.001 (Highly significant)

Rural-Urban community

Table 7 shows ocular lesions in leprosy
patients living in mural & urban areas. Out of 97 patients
belonging to rural area a higher number 1.0. 70 (72.16%)
patients were unfortunate to have ocular lesions while out
of 83 patients belonging to urban area only 32 (58.55%)
were rictims of ocular lesions.

Table 7

PREVALENCE OF OCULAR LESIONS BY BURAL URBAN COMMUNITY

Abral-Urban	No. of patients studied	No. of patients with eye	Prevalence
		lesions	
Rural	Y7	70	72.16
Urban	83	32	38.55

 $x^2 = 20.57$

degree of freedom - 1

p /0.001 Highly significant &

Occupation

Table 8 shows prevalence of ocular lesions in leprosy patients engaged in various occupations.

Table 8

PREVALENCE OF OCULAR LESIONS BY OCCUPATION

Occupation	No. of patient studied	No. of patients with eye lesions	Prevalence
Students	10	2	20.00
Businessman	12	3	25.00
Servicemen	18	5	27.77
Farm er s	35	22	61,11
Labourers			68.57
Housevises			55.05
Unemployed, retired or other	37		. 15.67

Prevalence rate was maximum among unemployed and retired persons (75.67%) followed by labourers (68.57%) and

farmers (61.11%). Students (20%), businessmen (25%) and servicemen (27.77%) were having comparatively lower prevalence of ocular lesions.

Sociesconomie status

Table 9 shows that majority of the patients under study (165 cases) were in low socioeconomic status belonging to socioeconomic group IV and V. Only 15 cases were from socioeconomic group II and III and none from group I.

Table 9

PREVALENCE OF OCULAR LESIONS OF LEPROSY BY SOCIAL CLASS

P	esh i er ci ncom	ap	athly ita	Social Class	No. of patien studied	its No. of patients with eye lesions	Preva- lence %
R	600	å	above	1			***
Rs	300	406	599	H	2		4
B	140	***	299	III	13		15.38
Is	60	**	139	IA	62	18	29,03
Bs	1	50		V	103	82	79.61

x2 = 48.44

degree of freedom +2

p / 0.001 (Highly significant)

Notes - Social classification- according to Shrivastava et al (1981).

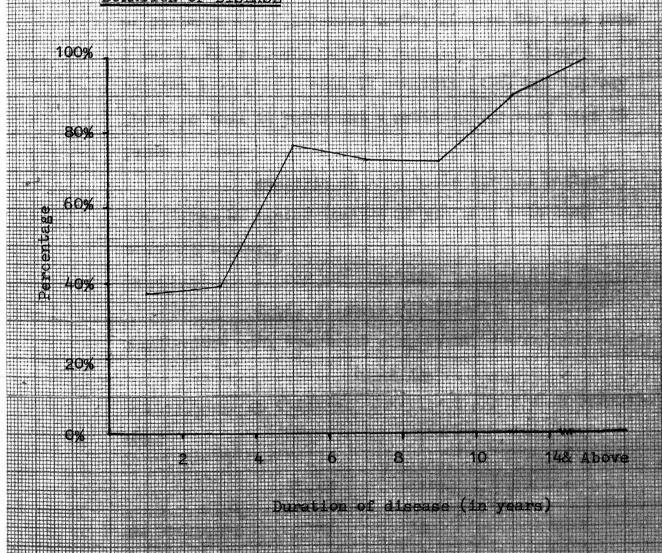
Analysis of this table reveals involvement of eye in legrosy patients belonging to lower socioeconomic groups - viz 82 (79.61%) and 18(29.03%) patients

Reble 10

WALDICE OF OCULAR LESTONS BY DURALION OF DISEASE.

thick of	the coulon Patients No. of Patients (No. of Patients with coulon patients with coulon patients with coulon patients with coulon patients with seasons (No. of Patients with coulon patients with coulon patients with coulon patients with coulon patients with No. of 18 (No. of Patients with coulon patients with coulon patients with coulon patients with no. of (No. of No. of No. of No. of (No. of No. of			Doct	The second second		Î	Ponatena.		Total	
80			H		No.ed particuts		No. of partients	Patients with coular lesions	No. of patients	24.3	1 8 8
20	8		8	•	2	7	82	12	19	a	(37.3%)
4 4 4 5 5 6 6 5 6 6 6 6 6 6 6 6 6 6 6 6	15		þ	•	•	•	3	5	*	E.	(者:第)
11 10 19 44 12 12 12 12 12 12 12 12 12 12 12 12 12	47 C C C C C C C C C C C C C C C C C C C	9	•	•			*	*	12	9	(76.9%)
15	4 61 180 102 102 102 102 102 103 103 103 103 103 103 103 103 103 103		•		•	•	-	2	5	4	(73.6%)
7 7 7 6 9 6 12 12 12 12 12 12 12 12 12 12 12 12 12	2	8		•	•	•	9		1 /(<i>Y</i> \	1
5 6 12 12 3 5 6 6 44 61 180 102	5 6 6 12 1.2 3 5 6 6 61 180 102	4	•	•	•	•	•	-	\$	•	(%0.06)
3 3 6 6 84 61 180 102	3 3 6 6 84 61 180 102	3	•	•	•	•	9	•	ä	12	(100.0%)
84 61 180 102	201 180 102	1	•		•	•	m	m	9	•	(100.0%)
					8	92	\$	61	180	5	(56.7%)

GRAPH SHOWING PREVALENCE OF OCULAR LESIONS BY DURATION OF DISEASE



belonging to group V &IV respectively. Only 2(15.38%) patients of group III had eye manifestations.

Duration of disease

In this study duration of disease among leprosy patients varied greatly (0-40 yrs); however, mean duration of disease observed was 5.9 years. Majority of patients 67(37.2%) were having disease for less than 2 years. 85 patients (47.2%) suffered from disease between 2-10 years. Only 28 patients (15%) had leprosy for more than 10 years and 6 patients for more than 20 years (Table 10).

Analysis of this table reveals higher prevalence of ocular lesions in patients with long standing leprosy.

Treatment compliance and duration

Table 11 shows relationship of contar involvement with treatment compliance.

Table 11

RELATIONSHIP OF TREATMENT COMPLIANCE AND COULAR INVOLVE-

	Total No. of patients	Pottents Number		eculor dans Reconst	
No treetment	22	11		50.0	
Regular treatment	91	27		29,67	
lereguler treatme	sat 67	64	Market of Augustan State	99.52	

Table 12

MANTONSHIP OF RESULAR TREATMENT AND OCULAR INVOLVENEET.

					Duration of disease	dissars			
	7 2 ms	2-4976	#-6yes	6-8778	8-10yrs	-6yrs 6-8yrs 6-10yrs 10-14yrs	14-20yrs	-720yrs Total	Total
	(#)98	11(3)	(6)%	3	2(2)			2(2)	20(20)
	2	•	2(1)	2(2)	1(3)		2(2)		19(7)
		2	1		•				13
			-	*			***		in
					N		9.		N
					-	-			N
1000	37(5)	(8)22	(9)6	11(6) 7(5)	3(3)	-	(a)	2(2)	91(27)

patients with couler involvement are shown inside ().

Table 15

REACTIONSHIP OF IRRECULAR PREACTIONS OR NO PREATMENT AND OCULAR INVOLVEMENT.

				Duratia	Durstion of diseas		A		
		E	Ě		9 10yrs	10-14yrs	14-20yrs	-720yrs	Total
	S	3	8	1(3)	1(1)				22(11)
1		3.3	Ş	8	1(1)	1(1)			25(23)
i i	\$	2(2)	4(1)	40		2(2)			10(10)
		3X		4(1)	1(1)	2(2)	3(3)		10(9)
				2(2)	1(1)	3		1(1)	\$(5)
			N.		2(2)	2(2)	43	13	(9)9
					2(2)		2(2)	15	\$(5)
	All and a second		.34			1(1)	4(4)	1(3)	(9)9
	(02)08	16(12)	3.4	8(8)	8(8)	(6)6	10(10)	(4)4	89(75)

Out of total 180 patients only 158 patients were taking treatment, among these 91 patients were regular in their treatment while other 67 patients were irregular in their treatment. A higher prevalence of ocular involvement was seen among the patient taking irregular treatment (95.52%). While comparatively low prevalence of ocular involvement was observed among patients on regular treatment (29.67%). Only 50% ocular involvement was seen among patients taking no treatment at all.

Involvement with duration of disease, duration of treatment among patients taking regular treatment. It is obvious from the table that no eye lesion observed among 22 patients taking regular treatment for more than 2 years. Eye lesions were common among those patient who were taking treatment for short period in contrast to longer duration of disease.

Table 13 reveals that all the patients, having disease for more than 4 years and taking no treatment or irregular treatment, were found to have eye lesions.

Eye lesions were not present among the patient with recent onset of leprosy.

There was the state of

Leurenz Reactions

Only 12 patients were in the reactional stabes at the time of examination, Among these, 3 patients

were having tuberculoid leprosy, 4 patients were having borderline leprosy and 5 patients were having lepromatous leprosy. Out of total 12 patients seen in leactions, only 7 patients were found to have ocular letions.

(Table 14).

Table 14

LEPROST REACTION AND OCULAR INVOLVEMENT

Type lepr reac	May			Number of petients	Patients with coular lesion No.(%)
Туре	1		and a state of the		4(50.0%)
Туре	II	+	(EVL)	4	3(75.0%)
Total				12	7(58.33%)

Ocular complaints

On direct questioning, about any problem of eye, a large number i.e. 35(19.44%) patients had complaint of distruction of vision.

Inspite of the presence of obvious and well established lesions in eyes of a large number of pattents the other complaints recorded were pain (ALAAK), radness (5.55%), watering (7.77%) irritation (A.AAK) and foreign body sengation (1.11%).(Table 15).

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ON THE SAME LADING TO THE TAX SOURCE

Table 15
OCULAR COMPLAINTS AND TYPE OF LEPROSY

	Tuberculoid	Borderline	Lepromatous	Total	Percentage out of 180 petients
Diminished vision	6	8	21	35	(19,44%)
Pain	1	2	5	8	(4.44%)
Redness	**	2	8	10	(5.55%)
Watering	2	2	10	14	(7:77%)
Irritation	1	1	6	8	(4.44%)
F.B. Sensation	•	1	1	2	(1,11%)

Visual Acuity

Table 16 shows the visual acuity of patients with various types of leprosy.

Visual actity in both the eyes was normal in 85 \$67.22%) patients. Among these 5 were above the age of 50 years. In 22 (12.22%) patients visual scuity of only one eyes was impaired varying from 6/9-3/60. 59(32.77%) patients were having diminished vision in both eyes. 6(3.53%) patients were found to be partially blind with visual actity less than 3/60 in one eye and 8(4.44%) patients were completely blind with visual actity less than 3/60 in both eyes. Further analysis of this table reveals that the impairment of vision was common among lepromatous leprosy patients 50(59.5%) followed by borderline leprosy patients 16(47.04%) and tuberculoid leprosy patients 29(46.69%):

Blindness, complete or partial was also common with lepromatous leprosy patients (8.33%) and borderline leprosy patients (11.76%) as compared with tuberculoid leprosy patients (4.83%).

Table 16
VISUAL ACUITY AND TYPE OF LEPROST

	Tuberculeid	Borderline	Leprometous	Total No. Percentage out of 180 patients
Normal	53	18	*	85(47.22%)
Impaired vision 6/9-3/60				
-Unilateral	5	2	15	22(12,22%)
-Bilateral	21	10	28	59(32,77%)
Blind _3/60 ~Unilateral				6(3.33%)
-Bilateral		**	5	8(4,44%)
	62	*	84	

Coular Adeneza

It includes eyebrows, eyelids, eyelashes, orbicularis oculi muscle and lacrimal system along with intraorbital extraocular structures.

Table 17
LESIONS OF OCULAR ADENEXA AND TYPE OF LEPROSY

Type of lesions	Patients	Tuberculoid Out of 52, Patients with lesions No(%)	Borderline Out of %4, Patients with lesions No(%)	Leprematous Out of 84, Patients s with lesions No(%)
Evebrana				
Complete loss	16(8.88%)	1(1.61%)	2(5.88%)	13(15,47%)
Partial loss	27(14.99%)	4(6.44%)	3(8.82%)	20(23.8%)
Thickening of supraciliary region	9(4.99%)	1(1,61%)		8(9.52%)
Nodule	5(2.77%)	•		(5(59.5%)
<u>Evelashes</u> Loss	20(11,11%)	2(3.22%)	2(5.88%)	16(19:04%)
Trichiasis	12(6.66%)	2(3.22%)	•	10(11,90%
Lid				
Entropien	9(4.99%)	1(1,61%)		8(9.52%)
Ectopies	5(2077%)	3(4.83%)	1(2.94%)	1(1,19%)
Thickening	11(6+11%)	1(1,61%)	3(8.82%)	7(8:33%)
Nodules	1(0,55%)			1(1,19%)
Lagophthalmos	5(2,77%)	3(4.83%)	2(5.88%)	
Lecurinel syst				
Chronic Actrycoystiti	a 3(1.66%)	•		3(3,57%)

Table 17 shows high percentage of equiar adenexal involvement among leprosy patients 52(28.8%) patients. Loss of eyebrows complete and partial was most frequent with leprometous p atients (39.27%) followed by borderline (14.7%) and tuberculeid (8.05%) Loss of eyebrow was found to be proportional to the duration of disease. Formation of nodules and thickenings of the skin of supraciliary ridge was common with lepromatous leprosy (5.95%) and (9.52%) respectively. Only one case of thickening of supraciliary ridge was observed in tuberculoid leprosy.

Madareais i.e. complete or partial less of eye lashes was also most frequent with lepromatous (19.04%) followed by borderline (5.88%) and tuberculoid (3.22%) forms of disease.

Legophthalmos, i.e. unability to alone
the palpebral aperture when an attempt is made, was
observed only among tuberoutoid (4.85%) and bordarline
cases of legrosy (5.88%). Out of total 5 cases of
lagophthalmos 3 cases were unilateral and 2 cases were
bilateral. Three cases were associated with ectropion
of lower lid.

Incidence of entropies and thickening of upper lid was common with Leprometous type of Leprosy (9:52%) and (8:33%) respectively. A cases

among these had signs of trachome. In a case of leprometous lepromy with reaction, a big module was present on the upper lid.

Syringing was done in 8 cases complaining of watering for long duration. Block at the masolacrimal duct level was detected only in 3 cases.

Continctiva

types of leprosy patients. High incidence of non leprotic lexions (45 cases, 23.66%) was observed. Non specific chronic catarrhal conjunctivitis was found common with lepromatous type of leprosy (10 cases, 11.9%). Only 3 cases (4.83%) of tuberculoid leprosy. had chronic conjunctivitis. Acute conjunctivitis was seen only in 5 cases (1.66%) of leprosy.

Table 18
LESIONS OF CONJUNCTIVA AND TYPE OF LEPROSY

Type of conjun- ctival lesion	Total Out of 180, Patients with lesions No(%)	Tubersulaid Out of 62, Patients with lexions No(%)	Borderline Out of 34, Patients with lesions No(%)	Leurometous Gut of 84, Patients with lesions No(%)
Acute Cenjun- ctivitis	3(1,66%)	1(1,61%)	1(2,94%)	1(1.19%)
Chromic conjuncti- vitis	14(7:77%)	3(4.63%)	*(2.946)	10(11,9%)
Pherygium	15(7:22%)	3(4.83%)	Jane 19	10(11-9%)
Pinguecula	8(9.44%)	2(3.22%)	1(2.94%)	5(9,95%)
Traciona.	13(7.22%)	4(64:4%)	2(5.80K)	7(8.19%)
Vit.A Petitolency	6(3.336)	1(1.61%)	2(5.88%)	3(3.57%)

Other non specific conjunctival legions like pterygium (7.22%), trachoma (7.72%), pinguecula (4.5%) and marephthalmia (3.5%) were also found to be frequent in all the three types of leprosy cases.

Schera

Involvement of solera was not very common with leprosy. Only one case of lepromatous leprosy in reaction was observed with epischeritis. In two cases of lepromatous leprosy, having disease for more than 9 years, a white hard nodule was present at the limbus involving solera as well as the cornea. In one case of lepromatous leprosy ciliary staphyloma was detected.

Cornea

Table 19 shows various corneal legions in different types of leprosy. Superficial punctate keratitis was observed in 12 cases. The legion was well established and visible to maked eye in 6 cases, all of whem had bilateral involvement of cornea. While in other 6 cases, it was observed, in a single eye as very faint subepithelial white punctate opecities when patients were examined on slit lamp.

In 5 cases (A leprometonis and I borderline), desper layers of corner of one eye were found to be involved. In all these cases superficial punc-tate keratitis was present in the other eye also and in parts of the corner of the same eye.

Bilateral impairment of vision was seen in all these cases.

CORPUS TOOMS ASSESSED TO CONTRACT THE THEFT WAS TAKEN

Table 19
LESIONS OF CORNEA AND TYPE OF LEPROSY

Type of corneal lesions	Total Out of 180, Patients with lesions No(%)	Tuberculbid Out of 62, Patients with lesion No(%)	Out of 34, Patients	Out of 84, Patients s with lesions No(%)
Superficial keratitis	12(6,66%)	2(3.22%)	2(5.88%)	8(9.52%)
Interstitial keratitis	5(2.77%)		1(1:94%)	4(4:76%)
Expesure keretitis	4(2,22%)	2(3.22%)	2(5.88%)	
Vicer	4(2.22%)	•		4(4.76%)
Panaus	7(3.88%)	2(3.22%)	2(5,88%)	3(3,57%)
Opacity	5(2.77%)	1(1,61%)	•	4(4.76%)
Impaired sensation	8(4.44%)	1(1,61%)	2(5.83%)	5 (5.85%)

Exposure keratitis was seen in 4 cases of leprosylin 3 cases it was associated with the Legophthalmon and extropion of lower lid, while in one case exposure keratitis in lower pole of comma of both eyes was due to partial closure of palpebook sperature during sleep.

Same tion of comment were considerably impaired in S cases of lepresy; All except two patients had discuss for more than S years and sensory impairment of comment among these was associated with other lesions of commen viz keretitis or complet ulcer. In one case of tuberculous and two case of before the leprosy comment sensetions were diminished without any associated lesions of spo-

Unilateral ulcer was seen in 4 cases of lepromatous leprosy. In a case of corneal ulcer H/O trauma by some foreign body was present. In 3 cases corneal sensitivity was markedly diminished. Photophobia, blepharospasm and severe pain, the characteristic features of corneal ulcer were absent in these cases. Only slight watering, diminished vision, and irritation were noticed by these patients. Slight circumcorneal congestion was also present.

Pannus, superficial vascularization of cornea, was seen in 7 cases of leprosy. Nebulanacular spacity in 3 cases, leucomatous epacity in 1 case and adherent leucoma in one case was observed.

Anterior chamber

Anterior chamber was deep in 6 cases of leprosy patients who had been operated for cataract in past. In 3 patients anterior chamber was shallow. (Table 20).

<u>Table_20</u>
ANTERIOR CHAMBER AND TYPE OF LEPROSY

Character	Total	Tuberculoid	BondarLine	Lepremetous
of Anterior Chamber	Outer 180. Patients with lesion No(%)	Out of 62, Patients as with lesions No(%)	Out of Ma. Petionts with lesions No(%)	Out of 84, Patients with lesions No(%)
Shellow	3(1,66%)	1(1351%)		e(2.30A)
Deep	6(3.33%)	1(1,61%)	1(2.94%)	4(4:75%)
G	3(1,66%)	•	1(2,94%)	2(2,30%)
Maa !	1(0,55%)	C. Jakie C. a. i Line a fra		1(1.194)

Reratio precipitates (R.Ps.) were seen on the posterior surface of cornes in total 3(1.66%) cases (2 cases of lepromatous leprosy and 1 case of borderline leprosy). Chronic iritle was detected in all these patients. Place was seen in one case of lepromatous leprosy.

Iris

Iris lesions were detected in 18 cases of lepresy (15 lepromatous, 2 berderline and 1 tuberculeid leprosy) (Table 21). Most common iris lesion observed was chronic iritis (12 cases). 10 cases of lepromatous leprosy, 1 case of borderline leprosy and 1 case of tuberculoid leprosy were victim of this lesion.

Table 21
LESIONS OF IRIS AND TYPE OF LEPROSY

Type of	Total	Tuberculoid	BordarLine	Laprematous	
	Out of 180, patients with lesions No.(%)	Out of 62, patients with lesions No.(%)	Out of 34, petionts with lesions No.(%)	Out of SA, patients with lesions No. (%)	
Acute initia	5(2,77%)		2(5.88%)	3(3,57%)	
Chronic Ivitia	12(6,66%)	1(1,61%)	1(2.94%)	10(11,9%)	
Iris Atrophy	2(1911%)			2(2,500)	
Iris pearl	1(0.55%)			1(1,1996)	
Tele marve	1 (9355%)		1(2,949)		
Pestarior synechia	5(2.77%)		1(2,9%)	4(4,760)	

Acute iritis was observed only in 5 cases of leprosy, 4 cases were in the reaction stage. Iris atrophy was seen in 2 cases of long standing lepromatous leprosy with chronic iritis. One white pedunculated mass projecting into the anterior chamber was detected in a case of lepromatous leprosy. Iris naevus was present in a case of borderline leprosy. The eye was otherwise normal in this patient.

5 cases of posterior synaechia were detected. One among these was belonging to borderline group and all others were belonging to leprematous leprosy group.

Pun41

types of leprosy. Pupil was found constricted in 17(9.44%) cases of leprosy. To cases of lepromatous leprosy, 5 cases of borderline leprosy and only 2 cases of tuberculoid leprosy were detected with constricted pupil. In all these patients light reaction was either sluggisth or absent. In a case of lepromatous leprosy occlusio pupillae was present in one eye.

In 6 cases papil was jet black and V shaped due to broad basal iridectomy performed along with loss extraction during cataract surgery.

In 5 ceaes of leprometous leprosy, without any sign of initis, pupil was elmost normal in size but the reaction was found to be sluggish.

Table 22
PUPILLARY LESIONS AND TYPE OF LEPROSY

Type of pupillary lession	Total	Out of 62. Patients with lesions No(%)	Borderline	Legromatous
	Out of 180, Patients with lesions No(%)		Out of 34, Patients with lesions He(%)	Out of 84, Patients with lesions No(%)
Constricted	17(9.44%)	2(3,22%)	5(14,7%)	10(11,9%)
Occlusie papillae	1(0.55%)			1(1,19%)
Broad Basal Iridectomy	6(3.30%)	1(1,61%)	1(2.94%)	4(4,76%)
Light reaction	a(1.11%)			2(2.30%)
Sluggish	18(1,00%)	2(3.22%)	5(14.7%)	11(13,09%)

Lena

Table 23 shows the prevalence of lenticular changes in leprosy patients. Evidence of unilateral or bilateral lenticular specity was present in 35 (19.44%) cases. Among these pathents 6 had detaract extraction.

6(3.33%) patients were having mature catarast in their one eye or both. Immature cataract was the most frequent Lenticular lesion, seen in 22 (12.22%) cases.

Analysis of this table reveals that lenticular changes were most common with leprometous leprosy (22 ceses. 25:136) followed by borderline 5 cases (17:54%) and buberculoid

(7 cases, 11,27%).

Table 23 LENTICULAR CHANGES AND TYPE OF LEPROSY

	Total Out of 180, Patients with legions No (%)	Duberculeid Out of 52, Patients with lesions No. (%)	Borderline Out of M. Petionts with lesions No(%)	Leprometons Out of 84 Patients with legions No(%)
Early immentr	12(6,56%)	1(1,61%)	3(8.82%)	8(9.52%)
Immature cateract	19(10.55%)	3(4.84%)	5 (14-7%)	11(13,09%)
Mature catare	et 6(3,33%)	2(3, 22%)	1(2.94%)	3(3,57%)
Hypermeture cateract	1(0,55%)	1(1,61%)		• • • • • • • • • • • • • • • • • • •
Aphakia	6(3,33%)	1(1,61%)	1(2.94%)	4(4.76%)
After catarac	t 1(0.55%)	1 (1,51%)	•	
Total number patients havi evidence of lentiquier of	ng 35(19.44%)	7(11227%)	6(17.64%)	22(25 ₇ 18%)

Table24 reveals that lenticular changes were more frequent shows the age of 50 years as compared to that of under 50 year.

PREVELANCE OF CATARACT IN DIFFERENT AGE GROUP OF LEPROST PATIENTS.

No.8 percentage out of total patients in that age group	Imberopicis No.4 percentage out of total patients in that age group	Dorderline Lepronatous No.6 percen- tage out of stage out total patients of total in that use petients group in that
30-40 40-50 6(17,15%) 50-60 (8(32,36%) 60-70 (8(32,36%) 70-30 (1(500,0%)	1 (6167%) 1 (6.35%) 5(37727%) 2(100.0%)	1(16.67%) 4(25.53%) 4(66.67%) 11(64.7%) 1(160.0%) 6(75.0%)

Fundus

Specific fundus lesions of teproxy were not observed in any patient. However non specific fundus lesions were detected. Vitreous was hazy in 5 cases of leproxy. Black opacities were detected in 2 cases and floaters were present in 1 case. Colloid bodies were detected in 3 cases, charteretinal scar in 1 case, opaque nerve fibres in 1 case and hard emudates in 2 cases. Macula was dull in 3 cases (Table 25).

Table 25
FUNDUS LESTONS AND TYPE OF LEPROSY

	Total.	Tuberouloid	Borderline	Legronatous
1	Out of 180, petients with lesions No(%)	Out of 62, patients with lesions No.(%)	Out of 34, pertions with lesions No.(%)	Out of 84, pebients with lesions No.(%)
Specific fundus Lesions	N43			. N. M.
Rom Special Lesions Vitrecus	ie fundus			
Pleakers.	1(0.55%)			1(1,19%)
-Opecities	2(1,119)	<i>*</i>		2(2.36%)
-Herry	5(2.77%)	3(4.834)	1(2.94%)	1(1019%)
<u>Dunitus</u>				
-Colleid Dodles	3(1,66%)	1(160)		42.3%
-Chordonet BORN	tneil 1(0.55%)	•	•	1(1219%)
-Queque na Cabre	1(0.55%)		1(2,94%)	
-Text end	ato 2(1,11%)	1(1,61%)		\$1(2.50 K)
-Dull Haci	1a 5(1.66%)	2(3,220)	1(2,549)	

Tension

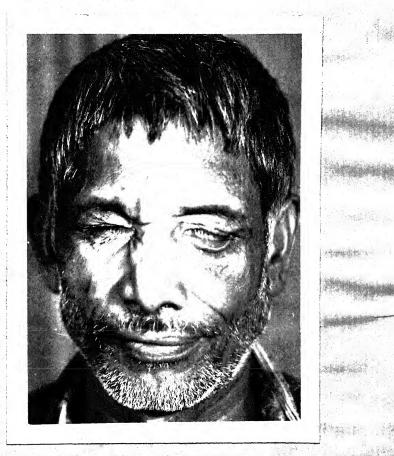
Intracoular tension was observed to be normal in both eyes in 157(87.22%) patients. In 15(8.33%) cases tension was found to be \(_ \) 10 mm of Hg in one eye (2 tuberculoid 3 borderline and 10 lepromatous leprosy patients). It was not possible to record intrascular tension in 8(4,44%) cases, who were having exposure keratitis or comment along in their one or both eyes. Surprisingly not even a single case was found to have intracoular tension -720 mm of Hg. (Table 26). 7 cases were detected to have tension difference more than 5 mm of Hg in between the two eyes.

Table 26
INTRACCULAR TENSION AND TYPE OF LEPROST

	Petal Out of 180, patients affected No. (%)	Puberculoid Out of 62, patients offented No.(%)	Derderline Out of M. patients effected No.(%)	Leoremateus Out of 84, potients affected No.(%)
Not recorded	8(4,44%)	2(3,22%)	2(5.88%)	4(4:76x)
∠10 mm Hg	15(8,33%)	2(3,22%)	3(8,82%)	10(1139%)
10-20 nm Hg	157(87.22%)	58(93.56%)	29(85,25%)	70(83.33%)
-720 mm Hg	NEE	MIT	MA	BAR
Difference				
B.E.	7(3,88%)	1(1,61%)	2(5),05%)	4(4,76%)



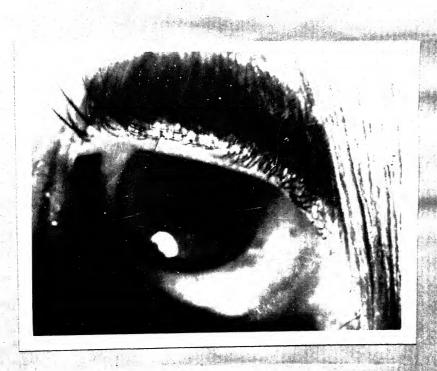
PHOTOGRAPH OF A LEPROSY PATIENT HAVING UNILATERAL LAGOPHTHALMOS



PHOTOGRAPH OF SAME CASE SHOWING INCOMPLETE CLOSURE OF LEFT EYE



PHOTOGRAPH OF A CASE OF LEPROMATOUS LEPROSY HAVING EYE INVOLVEMENT



PHOTOGRAPH OF THE EYE OF ABOVE CASE SHOWING SUPERFICIAL KERATITIS



PHOTOGRAPH OF A CASE OF LEPROMATOUS LEPROSY HAVING EYE INVOLVEMENT



PHOTOGRAPH OF THE EYE OF ABOVE CASE SHOWING ACUTE IRITIS

DISCUSSION

Leprosy, a disease of cosmopelitan distribution, takes a deventating course engulfing various parts of the body including the eye, resulting in blindness. It is a basic human right TO SEE; thus the eye, which somehow or other becomes the victim of the leprosy, is the cause of concern to humanity. Prevention of damage to eye by leprosy is essential.

In the present study, 84 patients had leprosy of lepromatous type, 34 benderline type and 62 tuberculoid type out of a total 180 patients. All the different types of disease, were found to be more common in males than the females (Table 3). Similar differences in prevalence of leprosy in both sexes were observed by Homes (1961) and Malla et al (1981). This sex difference is probably due to greater susceptibility rather than greater exposure in case of males as compared to females (WHO, 1966).

Out of total 102 patients, coular findings were observed in 72.6% cases of leprometous type, 47.00% of borderline type and 40.3% of tuberculoid type. Sehgal et al (1976) found ocular lesions in 43.4% of leprometous and 18.7% of tuberculoid type. The difference in these

findings may be due to the fact that we included all
the coular features in the series, even those supposedly
not due to legrosy. Weerskoon (1969) found eye involvement
in 47% of legrosy patients in Ceylon, but he did not
mention the type. Sheild (1974) quotes prevalence rates
by several different workers varying between 6% and 90%
depending upon the type of legrosy, mean age, average
duration of disease in the series and oritoria lequipments
used for the diagnosis:

Though ratios of male and female population was 3.3:1 in this study, no significant sex-wise difference was observed in incidence of ocular legions (X2-0.1820, df-1 and p -70.05). Similarly, Emira (1970) did not notice may significant difference in ocular legions between the two sexes.

A higher prevalence of oculer involvement was seen among widows, widowers and separated laprosy patients (94.73%) as compared to unmarried (35.33%) and married (46.03%) (Table 6). This difference was highly significant statistically (X²- 29.61, df -2 and p/0.001). Factors responsible for this may be, higher age of these groups of patient in comparison to those not married, longer duration of disease alongwith reluctance to take treatment. Further, parsons living alone are known to neglect their health needs.

Higher prevalence of ocular lesions in patients belonging to mural community (72.16%) as compared to the urban (38.55%) (Teble 7) is statistically highly significant (x² - 20.57, dr- 1 and p/0.001). Poor hygiene, lack of adequate and specialist medical facility and late initiation and then irregularity in treatment may be the responsible factors among rural patients.

Legrosy is thought to be prevalent commonly in lower socio-economic group (Park and Park, 1980). Majority of our patients belonged to low socioeconomic groups i.e. IV and V. Ocular lesions were more frequent in these groupsi(29.03%) in class IV and (79.61%) in class VI as compared to the others (15.38% in class III). Poor hygiene and mutritional status alongwith inappropriate medical care may be the responsible factors for this. It can not be established that occupation has direct impact on the prevalence of ocular complications due to close association of the occupation to the social class. Finding ocular legions more in unemployed, retired and occasional workers may be due to disabilities and eccasional workers may be due to disabilities and deformities depriving them of the employment. It is well known that a mumber of leprosy patients become beggers because of their being social outcasts.

Duration of disease - Duration of Leprosy varied from 0-40 years with mean duration of 5.9 years. A higher incidence of ocular involvement was observed among the patients having disease for more than 4 years (--/70%).

All patients having disease for more than 14 years were found to have ocular lesions (Table 10). Our findings are highly significant ($X^2 - 35.01$, df-3 and p (0.001) and are in accordance with Kirwan (1955)

who stated that longer the duration of disease the commoner were the ocular complications.

It was also observed that ocular complications tend to occur much earlier in course of lepromatous than borderline or tuberouloid types of leprosy. Variation may be due to difference in pathogenesis of ocular involvement in lepromatous and tuberculoid leprosy.

Treatment compliance

Legions (95.52%) was observed in patients taking irregular treatment as compared to that in patients taking regular treatment (29.67%), Abamos of any scular begion in patients taking regular treatment for more than two years established the significance of regular treatment in preventing the coller complications, Further, effectiveness of regular treatment against occler complications was found less in the patients with shorter duration of treatment and in comparison to longer duration of disease.

High frequency of couler locious in petients taking propelly due to ineffectiveness of pregular treatment against ocular complications, along with the negligence of these petients to their general health and ocular problems. A high number of nonleprotic lesions were also observed in these petients. No specific study has been done to evaluate the role of systemic treatment in prevention of ecular lesions. Yet the views of various workers are in accordance with our findings (Cheyce 1964; Ebenezer 1963 and Helmes, 1957). Bairs (1970) reported " Nedern treatment seems to reduce the incidence of ocular complications and blindness in leprosy ".

*

Language Reaction - Seven patients were found to have occular lesions swong 12 patients of leprosy seem in feaction stoke (Table 14). Adute painful, congestive form of fritts was seem in four cases of leprosy. Among these, three cases (75%) were seem with crythema medagum leprosum. Similarly a higher prevalence of coular involvement especially acute tridocyclitis was expected in leprosy reaction by Weerekoom (1969) and other workers.

Ocular complaints - Only a few patients complained of ocular problems despite the large number of patients with some eye lesions. Especially few serious eye lesions expected to be much haressing in normal persons were found to be symptomless. However, most common complaint was the diminution of vision in 35 (19.44%) symptomatic patients (Table 15). Pain, redness, vatering, irritation and f.b. sensation were infrequent. Similarly, Shalls (1974) did not reported any complaint in a number of patients

despite obvious irritation of eyelids, conjunctive and cornea. It may be due to decreased corneal and conjunctival sensitivity. I personally feel that mildness of early ocular symptoms in comparison to the other non-ocular disfiguring lesions in the body of leprosy patients, is responsible factor for comparatively few ocular complaints.

Yisual Acuity - Visual acuity was found to be normal in 85 (47.22%) patients and impaired (between 6/9 - 3/60) in 81 (44.99%) patients (Table 16). There was considerably high number of partially or completely blind patients, i.e. 14(7.77%). Visual acuity was/3/60 in one or both of their eyes. Among these 6(3-33%) patients were partially and 8(4.44%) were completely blind. Srivastava et al (1978) reparted the prevalence of blindness in general population in this region to be 1.79%. Thus the prevalence of blindness in leprosy patients of Bundelkhand region (7.77%) is considerably high.

The causes of blindness in laprost patients were about in 50% due to laprotic lesions (42.84%) initis and 7.14% keratitis and 35.70% due to cataract and remaining due to other causes. The prevalence of blindness was more in cases of lapromatous type (8.33%) and bendarine type (11.77%) in comparison to tuberculoid type (4.86%).

This can be explained by the fact that there is early and more coular involvement in lepromatous and borderline leprosy.

Iritis was found to be the most common blinding lesion (42.84%) in this study. This has also been reported as the most common cause of blindness in leprosy patients by many workers (Pfytche, 1981). However, expenses keratitis described as the second most common cause of blindness was not observed in this study. This is due to the fact that all 4 cases of exposure keratitis seen in our study were in early stage and they were taking treatment for their scalar problems. Thus, if exposure keratitis is managed properly the blindness caused by it can be delayed or prevented.

Prevalence of blindness in this study
(7.77%) may be compared with the other studies on Leprosy
patients. Weerekeen (1969) reported prevalence of blindness
to be 13.6% among leprosy patients of Ceylon. Reddy et al
(1981) observed in the blindness in 6% cases. Malla et al
(1981) reported blindness among 13.9% cases of tuberculoid
and 26.1% cases of leprometous leprosy in Nepal.

A low prevalence of blindness (1.34%) was observed in Uganda (Emiru, 1970) and a little higher (5.8%) in Northern Ghana (Chatterjee and Chaudhary, 1964).

The difference may be due to variation in the age, mean duration of disease and type of leprosy patients included in the study.

Coular Adenaxa - Involvement of scular adenaxa was found in 52 (28.8%) leprosy patients. This high frequency of involvement of scular adenaxa is because of structural similarity of lid, eyebrows and systashes to the skin. Lesions extend directly from the skin to these tissues. Moreover, being one of the most exposed part of body, these are the preferential sites for ledging of M. Lepros, Emiru (1970) has reported adenaxal lesions in 14.8% cases and Sahgal et al (1976) reported it in 17% cases.

ebserved in 43 (23.77%) cases. It was found to be the most frequent in Representation patients (39.27%) followed by borderline (14.7%) and tuberculoid patients (8.05%) (Table 17). This is due to the infiltration of heir follieles in the Representation Representation of heir frequency of less of symbosom in Representations Representations found only 5.7% cases of less of eyebrows, probably due to lesser number of Representations cases in their series.

Loss of eyelashes was observed in 20(11.11%) cases. It

was more frequent in lepromatous (19.04%) than in tuberculoid (3.22%) or borderline (5.88%) leprosy. These results are similar to Wasfy (1971) series and Malla et al (1981) series.

Entropien was observed in 9(4.99%) cases, mostly in lepromatous 8(9.52%) patients. Sheild (1974) and Harrel (1977) observed this lesion in 13% and 20% cases respectively. Higher average age of patients and longer average duration of disease in their series may be the contributory factors for difference in results. Trichiasis, was observed in 12(6.66%) cases. The results are almost similar to the other series (Chaudhary and Chatterjee, 1964; Mala et al. 1981). Skin of supraciliary region was found to be thickened in 9(4.99%) cases, more so in lepromatous (9.52%) than in tuberculoid types (1.61%). Sheild (1974) reported 29% cases with this lesion. This difference in results are because of difference in the mean age of patients and average duration of disease.

Legophthalmos was found in 5(2.77%) cases.

It was bilateral in 2 cases and unilateral in 3 cases.

Prequency of lagophthalmos was more in tuberculoid 5(4.83%) cases and berderline 2(5.88%) cases. Almost same findings were observed by McLaren (1961) and Chatterjee and Chaudhary (1964). Harrel (1971) shaperved 9 cases of lagophthalmos among 48 laprosy patients in Canal-Zone.

In his series high average age of patients (66 years) and long average duration of hospitalization (% years) seems to be the contributory factor for higher incidence.

Involvement of lacrimal sac was not much frequent. Only 3 (1.66%) cases were detected with chronic dacryocystitis, inspite of depressed nose bridge in much more patients. All these 3 cases were in advance stage of lepromatous leprosy with depressed nose bridge. Vesnekoon (1969) reported 2.2% cases and Harrel (1974) reported 2.0% cases of lacrimal sac involvement in leprosy patients.

Combunctival legion detected in present study was the chronic conjunctivities. It was detected in 14(7:77%) cases followed by non-specific ptervgiam in 13(7:22%) cases, trachoma in 13(7:22%) cases, pinguecula in 2(4:44%) cases and vit.A deficiency in 6(3:33%) cases. Acute computativities with nucepuralent discharge was present in 3 (1:66%) cases. High frequency of chronic computativities was observed in patients with lepromatous laprosey 1.0. 10(11:0%) cases, followed by tuberculaid laprosey 3 (4:53%) cases and borderline leprosey 1(2.94%) cases. Our findings are similar to the findings reported by Malla et al (1981). He reported chronic conjunctivities in 9:8% of lapromatous laprosey cases and 3:8% in tuberculoid cases. I high

percentage of non-specific conjunctivitie (17.6%) was reported in leprosy patients of Northern Chana by Chatterjee and Chaudhary (1964).

Higher incidence of pterygium, pingueoule, trachoma and vit. A deficiency observed in leprosy patients may be due to regional climatic conditions. Further, poor hygiene, poor health and low socie-economic status of leprosy patients may be the contributory factors in their occurence.

Science legions were not found to be frequent, yet they were specific and significent. White hand notule at limbus in two leprematous lepresy cases were similar to that reported by Bairu (1970). Scientific and episcleritis reported to be 11% and 5% by Weerskown (1969)& Sheild (1964) respectively were not frequent (0.5%) in our series.

Cornea - Lesions of cornea in leprosy were very specific, characteristic and pathognomenie. The most common and one characteratic feature of scalar manifestations in leprosy was superficial karatitis in 12(6,66%) cases followed by interatitial karatitis in 5(227%) cases exposure karatitis in 4(2,22%) cases, leprotic panns in 7(3.88%) cases, corneal opacity in 5(2,77%) cases, corneal placer in 4(2,22%) cases and impaired sensation in 8(4,44%) cases (Table 19).

Superficial keratitis, peculiary without any complaint from patient, was found more commonly in lepromatous leprosy i.e. 8(9.52%) cases than in borderline 2(5.88%) cases or in tuberculaid leprosy 2(3.22%) cases. Almost similar findings had been reported by Dethlefs (1981). Sheild (1974) had reported a higher percentage of this lesion (19%). This difference is prebably due to high average age and long average duration of disease in his series.

Interpolitial keratitis was seen mostly in A cases (4.76%) of lepromatous leprosy, followed by bonderline leprosy 1 case (3.22%). Comparatively lower frequency of interpolitial keratitis (0.4%) had been reported by Chatterjee and Chandhery (1964). In contrast to 1t a frequency of 6% had been reported by Shelld (1974).

Exposure keratitis was not seen in much violent form in our series as reported by others. A possible explanation may be that in all these cases duration of lagophthalmos was not —2 years and petients were taking regular treatment. Among 4 cases (2.226) of exposure keratitis in our study one was due to incomplete closure of eye during sleep. This patient showed otherwise normal orbicularis oculi. Harley (1977) observed 12%

cases of leprosy with exposure keratitis. In his series average age of patient and average duration of disease were higher than in ours.

corneal ulter was observed in 4 cases (2:22%) of lepromatous lepromy. In one case it was due to trauma and in the three others due to impaired corneal sensation. There was mild to moderate pain and slight ciliary congestion in all these cases.

Pennus, the superficial vascularization of cornea, was found in 7(5.88%) cases. In 5 (2.77%) cases, it was typical of trachonatous pennus, however, in 2(1.11%) cases it was typical improved pennus. Sangal et al (1976) separted incidence of leprovic pennus in 1.16% cases of leprosy. Dethlers (1981) found no leprovic pennus in 110 Leprosy petions in New Guinea. Harroll (1977) reported a very high frequency of leprovic pennus (43%) among leprosy patients of Canal-Zone. Explanation of this discrepancy may be the regional and ractal variations along with difference in the average age of patients and average duration of illness.

Though, opacity of cornea is not specific of leprosy, yet it has been reported in leprosy patients by various workers. In 3 (1.66%) cases in our study, it was nebulomecular opacity due to trichiasis and trachoms. In one case leucomatous opacity was present as a sequelae of corneal wicer and in another case adherent leucoma was seen as a sequelae of perforation of corneal when

Semsations of commea were found markedly impaired in 8(4.44%) leprosy patients. Similarly less of sensation was observed in 7% leprosy patients in Nepal and New Guinea by Malla et al (1981) and Dethlefs (1981) respectively. Ticho and BenSira (1970) reported less of sensation in only3% leprosy patients of Malawi. Few workers have reported a very high frequency of less of sensation e.g. 36% by Saxena and Dwivedi (1971), 67% by Harrel (1977) and 70% by Reddy et al (1981).

Thickening of corneal nerves and bead like formation on corneal nerves were not observed in this study. Hibi (1956) did not reported significant thickening of corneal nerves in lepromatous or neural type of leprosy. Somerset (1962) also clearly mentioned nodular thickening of corneal nerves in leprosy patients as very unusual.

Iris- Itis lesions in leprosy patients especially chronic iritis, iris atrophy and tris pearl are very characteristic and pathognomenic. In this study, 18(10%) cases with iris involvement were detected. Similarly, Hobbs (1972) observed 8% leprosy patients with iris involvement. However few workers reported very high percentage of iris lesions.

(19% by Sheild, 1974; 59% by Harrel, 1977). This higher involvement of iris was explained by some factors in their study. They included mostly lepromatous leprosy patients

with higher average age and longer average duration of disease. Chatterjee and Chaudhary (1964) observed iris involvement in only 3.8% cases, as in their study the number of non leprematous patients was much higher than leprematous.

Chronic iritis, mest common and slowly growing disestrous lesion was observed in 12 (6.66%) cases. Most of them belonged to leprometous groups 10(11,9%). Similarly, Chatterjee and Chaudhary (1964) observed chronic iritis in 8.75% cases of leprometous lepromy. Dethlers (1981) and Mella et al (1981) also reported higher incidence of chronic iritis in leprometous leprosy patients. The visual aculty was found considerably impaired in these cases.

Abute iritis was observed in 5(2.77%) cases, Among these 4 cases were in the reactional states. One case of borderline leprosy with scate iritis was not showing any sign of seaction. Acute inflammatory symptoms were seen in all these cases with considerable visual impairment. Almost similar to our findings Sheild (1974) and Reddy et al (1981) had reported 2% incidence of scate iritis among leprosy patients.

Iris atrophy was observed in 2(1.11%) cases of leprosy. It was seen as a marked patchy degeneration of iris strong and loss of pigmentary epithelium. However,

hole in the iris was not seen in any of leprosy patient as reported by Slem (1971).

Iris pearl, a very characteratic and pathognemente though not a frequent sign of leprosy, was seen in only 1(0.55%) patient in this study. Other workers also reported almost same figures; 2%, Ffytche (1981) and 3%, Dethlefs (1981). Large number of workers were unable to find out iris pearl in any case. Weerskoon (1969) and Emiru (1970) both were able to find out one case of iris pearl among 630 and 890 patients examined respectively.

Iris macros, though not characteratic of leprosy, was present in a case of borderline leprosy. The eye was otherwise normal suggesting it to be non-pathological, However, detailed histological study of this lesions is essential to reach any conclusion.

Posterior synechia was observed in 5 cases as a sequelan to the long standing chronic iritis.

Funillary lesions - Pupil was constricted in 17(9.44%)
leprosy patients. Cause of constricted pupil was either
chronic or acute iritis. Light reaction was found absent
in 2(1.11%) cases and sluggish in 18(10%) cases (Table 22).
Our findings were in accordance with those of Sheild(1974).

He observed irregular pupil in 10% cases and sluggish reaction in 18% cases. Peripheral, post ganglionic autonomic denervation has been reported to be the contributory factor for this ocular manifestation (Ffytche, 1981) This view is supported by the findings of phermacological study by Swift and Bausthard (1972). Lenticular changes - Cataract is the commonest cause of blindness in India. Lenticular changes were detected in 35 (19.44%) cases. Most common lenticular changes observed were immuture and mature exteract (Table 23). Out findings are in accordance with other workers 12% Weerskoon (1969) - 15% Samena and Dwivedi (1971): 29% Shoild (1974) and 23.9% Malla at al (1981). Though there is no direct invasionof less by laprosy bacilli, the lenticular changes observed in leprosy patients may be secondary to tritts (Sommerset, 1962) or due to senile Drocess.

The lenticular changes were common with lepromatous leprosy (26.18%) than tuberculaid (11.27%) or berderline leprosy (17.64%). The difference may be due to high frequency of chronic iritis in lepromatous leprosy patients leading to secondary cataract or due to biochemical changes caused by M. Lepros present in the iris of the lepromatous patients (Probhekaren, 1971).

changes were detected in the age group —7 40 years except for a case of traumatic cataract aged 32 years. Incidence of lenticular changes found to increase with the age of leprosy patients i.e. 23.5% in 5th decade, 64.70% in 6th decade, 75% in 7th decade and 100% in 8th decade of life (Table 24). However, Soraby (1964) clearly mentioned that presence of lenticular changes above the age of 40 years was most commonly due to senile ageing process and gradual increase in percentage of cases were found in successive decades.

percentage of lentiquier opecity in leprometous lepromy cases then in the other two groups. Thus, though it will be premature to conclude that lepromy leads to the cataract formation yet the process is accelerated in lepromy. It is mainly because of associated initia and partly because of bischemical or other unknown cause. This subject requires more detailed study.

Fundus lesions - No specific fundus lesion of leprosy was observed. Similarly, Tiche and BenSire (1970), and Halla et al (1981) were unable to find any specific fundus lesion emong leprosy patients. Most probable explanation is that we were not able to examine the

fundus of well advanced cases of ocular lesions among lepromatous leprosy patients because of constricted pupil and opacity in media. Elliot (1949), Somerset (1956) and Choyce (1969) all agree with the point that fundus lesions behind the equator of eyeball are less common. However, non-specific eye lesions were detected. The number of the findings in the posterior segement were too small to form the basis of any conclusion especially as there has never been any survey of the fundi of the normal population. Hard exudates observed in the macular and paramacular area of two cases and chario-retinal scar observed in a case may be of some significance.

Intra Ocular Tension - Intra coular tension (IOT) was normal in most of cases (87.22%). I.O.T. was / 10 mm. Hg in 15 (8.52%) cases. It was not found to be -- 20 mm. Hg in any case of laprosy. Very few reports were available in literature on IOT in laprosy patients. Reports by some workers suggested primary glaucoma as a rare finding in laprosy patients (Prendergast, 1940; Sheild 1974; Brandt et al., 1981). They established the fact that obliterating changes in the ciliary body itself counteract the primary glaucomatous changes in the trabecular meahsure through diminished production of aqueous. This may be responsible for the reduced IOT found in our cases.

Secondary glaucoma were also not found to be frequent by Brandt et al (1981). He suggested that in leprotic chronic iridocyclitis, excretion of protein leads to an increased viscosity of aqueous humour and proteins acts as an additional barrier in the trabecular mesh work. So aqueous reducing component outweight the diminished filtration of aqueous resulting in secondary glaucoma as a rare finding.

SUMMARY
AND
CONCLUSION

The state of the s

Leprosy, a chronic infectious disease, cosmopolitan in distribution known for the ages, affects most of the parts of the body including the eyes leading to blindness. Depending upon the immunity of host it can manifests in lepromatous, tuberculoid or berderline form. Ocular lesions in leprosy may result indirectly from the paralysis of V and VII cranial nerves or directly by the invasion by M. leprae. Hypersensitivity reactions or secondary infection also damage the eye.

All the changes that affects the body in leprosy can affect the eye and its adenexa, so the ocular manifestations have no mystery of their own. The disease shows same relentless chronicity in the eye, as in the other parts of body.

Estimated number of leprosy patients in the world are more than 12 million, among these 5.0-7.5 lacs have blindness. Despite major advances in recent years in the understanding of the pathology and treatment of leprosy, ocular complications still pose the greatest single threat to the patients.

Present study was undertaken to asses the prevalence of ocular lesions in leprosy patients of Bundalkhand region, its relationship with the duration and type of the disease and to find out preventive value of regular and controlled treatment of leprosy with the eye involvement.

A series of 180 patients of all ages (mean age 41.56 years) and both sexes (male 138; female 42) attending the leprosy clinic of M.L.B. Medical College Hospital, were included in this study. Patients were diagnosed by dermate venereologist and the type was confirmed by histopathological examination. They were broadly grouped into lepromatous tuberculoid and borderline leprosy.

Details of the information of each patients was recroded on a pre set proforms followed by external examination and necessary investigations. Slitlamp examination, funduscopy and tonometry of each case was done.

Out of total 180 patients, 84 belonged to lepromatous type, 34 to the borderline type and 62 to the tuberculoid type. Eye lesions were detected in 102 (56.7%) cases, most of them i.e. 72(40.0%) were having typical leprotic eye lesions. Eye lesions were more common in

lepromatous leprosy (72.6%) followed by borderline (47.0%) and tuberculoid (40.3%).

Prevalence of ocular lesions was found more in the patients of advanced age group (about 80% in patients -750 years), residing in the rural community (72.14%), belonging to the low social-economic group (79.61%), suffering from disease for long duration (100% in patients with -714 years duration) and not taking regular treatment.

The part observed to be most commonly effected was ocular adenexa, followed by conjunctive and cornea. We specific fundus lesions was found in any case. Vision was greatly affected, mostly in lepromatous type of lepromy.

In the light of the present work and with a view of studies done in the past, the fellowing can be concluded.

- 1. Leprosy affects the persons of almost all age group, but manifests most commonly in 3ed to 6th decade.
- Prevalence of ocular lesions is 56.7% among leprosy
 patients, in Bundelkhand region. However, it is only
 40% due to specific leprosy lesions.
- 3. Ocular involvement is most, common, in lepromatous leprosy (72:60%) followed by Borderline (47.00%) & least in tuberculeid time (40.30%).

- 4. Ocular involvement is most common in the leprosy patients of higher age group, belonging to rural community and low socio-economic group.
- 5. Longer the duration of disease, more frequent is equal involvement.
- 6. Early initiation and regularity of systemic treatment have definite role in prevention of ocular complications of leprosy patients.
- 7. Most frequently an early eye lesion, is the adenoxal involvement in the form of, complete or partial less of eyebrows, eyelashes, trichlasis and thickening of lids and supraciliary skin.
- 8. Lagophthalmos, Mostly seem in tuberculoid type and borderline type, is mainly responsible for the exposure keratitis and its complications. These complications may be prevented by early institution of local treatment.
- 9. Though chronic conjunctivitis is frequent, it is not specific for leprosy. On the centrary, scheral nodules are in-frequent, yet are characteristic feature of leprosy.
- 18.Corneal involvement, particularly supperficial keratitis, interstitial keratitis and leprotic pennus are very characteristic features of leprosy, occuring mostly in lepromatous type of leprosy. Superficial punctate

keratitis starts from the limbus and enchroaches towards the centre of cornea, without any symptom in early stage. Interstitial keratitis though not much frequent, is one among the serious complications of leprosy, leading to blindness.

- 11. Chronic iritis the most common cause of blindness in leprosy mostly occurs in lepromatous type of leprosy. This disastrous lesion produces no symptoms in early stages and can not be diagnosed by slitlamp examination. Iris pearl though not frequent, is the most pathognomonic specific feature of this disease, it is seen as a whitish nodule, projecting on the surface of iris.
 - 12. Acute fritis is not specific and mostly occurs in reactional states of the disease.
 - 13. Though lenticular changes are more in lepromatous type of leprosy patients yet it will be premature to conclude that leprosy leads to cataract formation. The process is accelerated in leprosy greatly because of associated iritis and partially because of biochemical and other unknown causes. The subject requires more detailed study.
 - 14. Leprosy somehow or other, produces changes in the structures related to aqueous formation and filtration, leads to low intraocular tension. This also needs special attention for study.

Thus, ocular manifestations are common in leprosy patients. Their early diagnosis is essential to prevent irreparable damage to the eye.

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DIX

APPENDIX - 1

OCULAR MANIFESTATIONS OF LEPROSY IN BUNDELKHAND REGION

PROPORMA FOR EXAMINATION

CASE NO

- 1. Name of Investigator
- 2. Surgeon I/C
- 3. Place
- 4. Date

DETAIL OF PATIENT

- 1. Name
- 2. Age/Sex
- Registration No. (In leprosy unit)
- 4. Address
- 5. Occupation
- 6. Seciosconomie
- 7. Married/Unmerried
- 8. Rural/Urban

CHIEF PRESENTING FEATURES OF DISEASE

- 1. Hypopigmented patches:
- 2. Impaired Sensation:
- 3. Nerve Thickening:
- 4. Nedules:
- 5. Non healing ulcers:
- 6. Deformity of hands:
- 7. Deformity of feetis
- 8. Deformity of faces
- 9. Others:

PERSONNEL HISTORY: Addicted to alcohal Tobacco
Other Interiornts

FAMILY HISTORY OF LEPROSY: Mother - Pather - Sen - Daughter

Brother - Sister - Wife -Husband

DURATION OF DISEASE :

BURATION OF TREATMENT:

Regular/Irregular -

Drugs used +

ANY DRUG REACTION + YES/ NO

TYPE OF LEPROSY

REACTION STATE :

HISTORY OF ANY OTHER CHRONIC SYSTEMIC DISEASE

OCULAR COMPLAINTS

1, Diminished Vision

Duration

Onset - Sudden/Gradual

- 2. Pain
- 3. Redness
- 4. Watering
- 5. Irritation
- 6. F.B. Sensation
- 7. Others

ANY MISTORY OF TRAUMA TO EXES : Yes / No

ANY TREATMENT TAKEN FOR EYE COMPLAINTS

ANY OTHER IMPORTANT INFORMATION

EXAMINATION OF EYE

Right

Last

1. YISUAL ACULTY

2. IMPORTANT PACIAL MUSCLES FUNCTION

Orbicularis Oculi

Prontalis

Others.

3. FASCIAL SENSATION:

Mormal

Impaired

Lost

4. ANY OTHER ABNORMALITY IN FACE:

5. EYEBROW

Mormel.

Complete less

Partial loss

Thickening of supraciliary

ridge

Modules

Others

6. EYE LASHES!

Normal

loss

Trichiasia

Others

7. LIA :

Normal

Entropion

Ectropion

Thickened

Ptosis

Lagophthalmog

Others.

8. Lecrinal Apparatus:

Normal

Acute Decryocystitis

Chronic Dacryocystitis

Lecrinal Abscess

Lecrinal Fistula

Others

9. Conjuctiva

Normal

Acute conjuctivitie

Chronie conjunctivitis

Pterygium

Others

10.Sclere

Normal

Nodules

Seleritie

Episcleritis

Staphylena

Cthers

11 CORNEA

Normal

Superficial Keratitis

Interstitial Keratitis

Expesure Keratitis

Band shaped Keratopathy

Prominent Nerves

Pannus

Opecity

Vicer

Reretintzetton

Sensitivity

(Normal, Impaired, lest).

Others

12. ANTERIOR CHAMBER

Normal

Depth

Contents : Hypopyon

Hyphaema

Giliary Flush

Flere

Cells

KPS

Others

13. IRIS

Normal

Acute Initis

Chronic Iritis

Iris Atrophy

Iris Pearls

Iris Naevus

Anterior/Posterior synechia

14. PUPIL

Normal

Constricted

Dilated

Irregular

Occlusio Pupillae

Seclusio Pupilige >

Light Reaction

Singgish

Normal

A bearing to

15. LENS

Normal

Early immature cataract

Immature cataract

Mature cataract

Hypermature cataract

Aphakia

Dislocated Lens

Others

16 OCULAR MOVEMENTS

Hormal

Restricted (Direction)

Phoplas

17. TENSION

(Schletz's Tenemeter)

18 FUNDUS

(Direct Ophthalmoscopy)

Vitreous

Disc

Vessels

Choreld

Retina

Macula

Others

19 DETAIL OF IMPORTANT LESIONS: